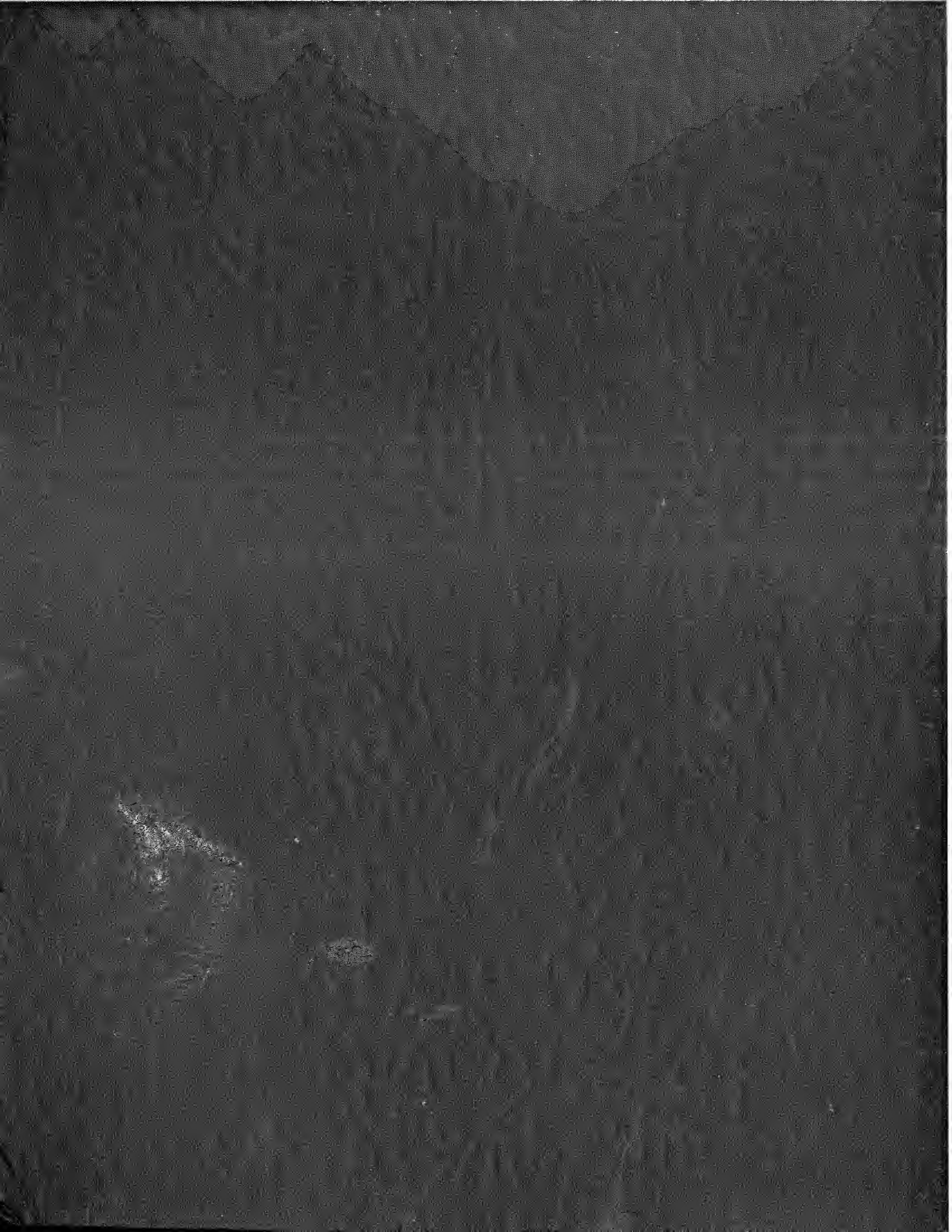
HOUSING VOLUME



MILCOR STEEL COMPANY

MILWAUKEE, WISCONSIN

AN AUTHORITATIVE VOLUME ON GROUP HOUSING CONSTRUCTION

SUBJECT: HOUSING PROJECTS

This is your personal book of Group Housing Construction details - originally designed for use in connection with large Government Housing Projects, but later adapted to private work not only for multiple housing, including apartment houses, but for many other types of buildings.

These details have been worked out in co-operation with many of the Housing Authorities and Architects on completed Housing Projects. They are the result of careful planning and checking for their suitability to this work.

The information contained herein deals principally with fireproof partition work -- the use of 2" Metal Lath and Plaster Partitions -- with the furring of exterior masonry walls -- and with Metal Base and Trim for use with such construction.

Below we point out as briefly as possible, the advantages of such construction, as determined by actual use in similar projects.

FIRST: THE 2" SOLID PLASTER PARTITION

A- Saving of Income Producing Space

2" Partition occupies 3.93% of Typical Room Area of 224 square feet.
4-1/2" Partition occupies 9.00% of Typical Room Area of 224 square feet.
5-1/2" Partition occupies 10.85% of Typical Room Area of 224 square feet.

Or converted into dollars @ 50¢ per cubic foot on the same typical room (assuming a Ceiling Height of 10 ft.) the 2" Partition saves $56.70 over the 4-1/2" Partition or $77.90 over the 5-1/2" Partition. Or the additional floor area obtained by using 2" Partition can be used in bathrooms, closets, door clearances, etc.

B- Dead Load

The 2" Partition weighs only 18-1/2 lbs. per square foot - permitting reduction of dead load with consequent savings in the design of substructure, structural frame and floors.

C- Fire Resistance

These 2" Partitions are given 2 to 4 hours rating by the Bureau of Standards; and have passed such tests not only as Fire Barriers, but also the necessary Hose Stream Test.

D- Sound Resistance
These Partitions have been rated 46 decibels by U. S. Bureau of Standards in Research Papers RP-800 and RP-48. This is superior to most any partition except the very heaviest masonry wall.

E- Strength
The continuous 2-way steel reinforcement of these partitions makes them a monolithic slab and, because they are firmly attached to both the floor and ceiling, prevents cracks which are common with other types of construction.

F- Low Erection Costs
Bids on this type of partition on actual Housing Projects based on a labor scale of $1.75 per hour have been obtained at $2.25 per square yard (and lower under some conditions). These prices include materials and labor for the completed wall.

G- Other Savings are effected by the Plumber, Electrician, and Carpenter Trades who figure less to finish their work on this type of partition than on masonry partitions. Furthermore an additional saving is effected because of the expense of cleaning up which is very small with the Metal Lath Partition as compared to other types.

SECOND: THE MILCOR FURRING SYSTEM FOR MASONRY WALLS

A- Insulation
The Milcor Furring System provides a free standing wall entirely independent of the exterior wall and furnishing whatever air space may be specified. This space may be filled with insulation if desired.

B- This Furring System is entirely erected by one trade and no plugs or special materials are needed.

C- Low Erection Cost

Based on a labor scale of $1.75 per hour, bids have been obtained on Housing Jobs at $1.95 (and less) per square yard of wall.

THIRD: SANITARY METAL BASE FOR 2" PARTITIONS AND EXTERIOR WALL FURRING

A- Many of the details shown in this book cover Metal Base developed by Milcor for 2" Solid Partitions and particularly for Housing and Apartment work. These Bases not only act as a Trim, but also form the Runner for attaching Partition Studs at the floor and as a ground for the plaster. They can be obtained in several different types to meet conditions on the job where various types of floors are to be used. The cost of these Metal Bases in place is less than a good type of wood base and wood nailing grounds.

B- Cased Openings
Note also a special type of casing for free standing walls, stair rail and dwarf partitions (Detail No.35) which has been specified in several of the leading Housing Projects.

This casing gives a very neat appearance to the finished work and is much less expensive than the ordinary type of door casing, or other types of stair rail or partition caps.

You will be interested in the illustrations of the Housing and Apartment Jobs wherein Milcor materials and Milcor Systems were used, both 2" Solid Partitions and Metal Base.

We hope that this book will be of some value to you and we want to offer our services to work out further details as you may require them. We are willing to go to considerable lengths to demonstrate the value of our systems to you and we would be very glad to demonstrate them to you at an opportune time even to the extent of building actual partition panels in your locality for your inspection.

We will be very glad to have any comments from you on the details already submitted and to make any additional ones for you on request.

Very truly yours,

MILCOR STEEL COMPANY

W. B. Turner

Manager
Fireproofing & Specialties Division

W.B.Turner-nk

HOUSING PROJECTS in which Milcor Products were Used

This formidable list of large housing projects is convincing evidence of the broad acceptance of Milcor products by Government architects and construction officials. We believe it reasonable to say that no other manufacturer of similar materials can present a record which even pretends to approach that made by Milcor.

Lowell Housing Project
Lowell, Mass.

Sunset Hill Housing Project
Fall River, Mass.

South Boston Housing Project
South Boston, Mass.

U.S.Navy Defense Housing Project
Newport, Rhode Island

Nelton Court Housing Project
Hartford, Conn.

South Jamaica Housing Project
South Jamaica, N. Y.

Mulford St. Housing Project
Yonkers, New York

Adrian Terrace Housing Project
Utica, New York

Syracuse Housing Project #1
Syracuse, New York

Syracuse Housing Project #2
Syracuse, New York

Kenfield Housing Project
Buffalo, New York

Willert Park Housing Project
Buffalo, New York

Lakewood Housing Project
Buffalo, New York

Williamsburg Ten Eyck Houses
Brooklyn, New York

Schenevus Housing Project
Schenevus, New York

The Dutch Village
Menands, New York

Lackawanna Housing Project
Lackawanna, New York

Westfield Acres
Camden, New Jersey

Lincoln Homes
Trenton, New Jersey

Mayor Donnelly Homes
Trenton, New Jersey

James M. Baxter Terrace
Newark, New Jersey

Stanley S. Holmes Village
Atlantic City, New Jersey

Chelsea Housing Project
Atlantic City, New Jersey

James Weldon Johnson Homes
Philadelphia, Pa.

Tasker Street Housing Project
Philadelphia, Pa.

Poplar Street Housing Project
Philadelphia, Pa.

George Hoverter Housing Project
Harrisburg, Pennsylvania

Gilmor Homes
Baltimore, Maryland

College Creek Terrace Housing Project
Annapolis, Maryland

Lincoln Apartments
Frederick, Maryland

Simon Bright Homes
Kinston, N. C.

Spartansburg Housing Project
Spartansburg, N. C.

Piedmont Courts Housing Project
Charlotte, N. C.

Gonzales Gardens
Columbia, S. C.

Capitol Homes
Atlanta, Georgia

Booker T. Washington Homes
Columbus, Georgia

Booker T. Washington Addition
Columbus, Georgia

George Foster Peabody Homes
Columbus, Georgia

University Homes
Atlanta, Georgia

Techwood Homes
Atlanta, Georgia

Newton D. Baker Homes
Columbus, Georgia

Frederick Douglas Homes
Phenix City, Alabama

Riverside Heights Housing Project
Montgomery, Alabama

Cleveland Courts Housing Project
Montgomery, Alabama

Brentwood Housing Project
Jacksonville, Florida

Meridian Housing Project
Meridian, Miss.

Hattiesburg Housing Project
Hattiesburg, Miss.

Lauderdale Courts
Memphis, Tenn.

Dixie Homes
Memphis, Tenn.

Boscobel Housing Project
Nashville, Tenn.

Abraham Lincoln Court
Paducah, Kentucky

La Salle Housing Project
Louisville, Kentucky

Valley View Housing Project
Cleveland, Ohio

Brand Whitlock Homes
Toledo, Ohio

Westlake Housing Project
Youngstown, Ohio

Trumbull Park Housing Project
Chicago, Illinois

Julia C. Lathrop Homes
Chicago, Illinois

Jane Addams Housing Project
Chicago, Illinois

Ridgedale Homes
Granite City, Illinois

East Moline Housing Project
Moline, Illinois

John Hay Housing Project
Springfield, Illinois

Greendale Housing Project
Milwaukee, Wisconsin

Parklawn Housing Project
Milwaukee, Wisconsin

Logan Fontenelle Homes
Omaha, Nebraska

Cherokee Terrace
Enid, Oklahoma

Will Rogers Court
Oklahoma City, Oklahoma

Apache Courts
San Antonio, Texas

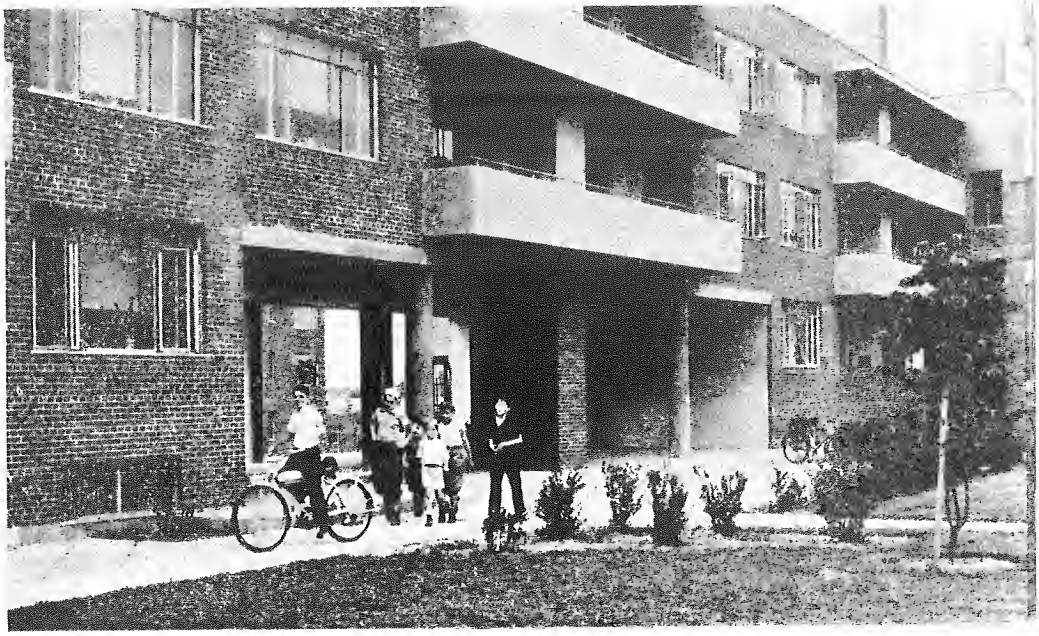
Wheatley Courts
San Antonio, Texas

Lincoln Courts
San Antonio, Texas

Corpus Christi Housing Project
Corpus Christi, Texas

WILLIAMSBURG HOUSES, Brooklyn, New York. Greatest of all slum clearance projects, cost $13,459,000. Here 19,000 families applied for tenancy in 1,622 dwellings—the twenty four-story apartments stand on a thirty-acre site.

Milcor Solid Partition System, including Floor and Ceiling Runners, Channels and Metal Lath, used in construction.



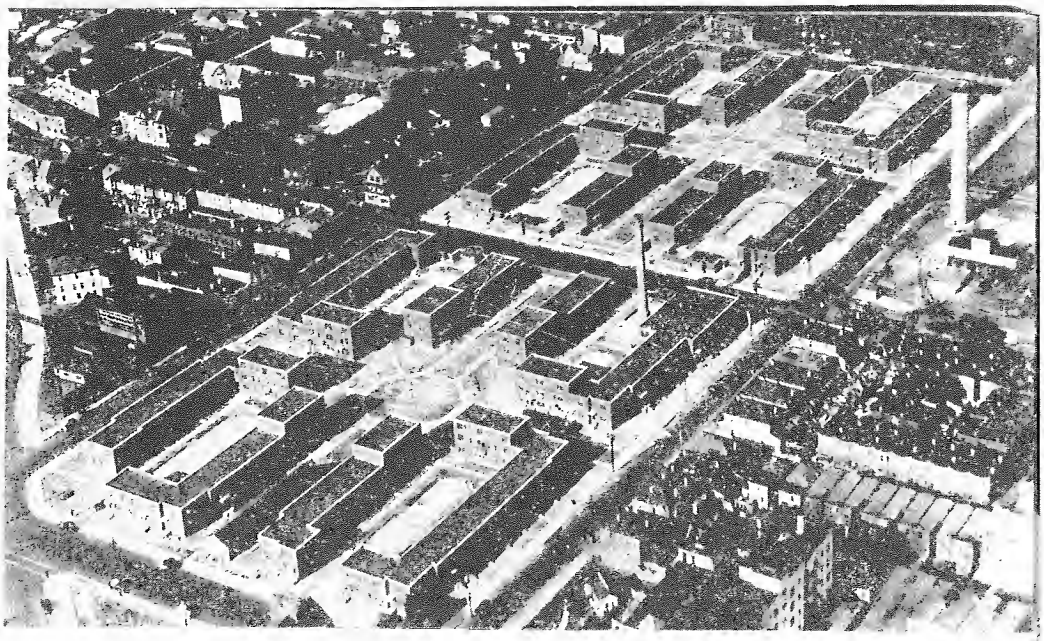
WESTFIELD ACRES, Camden, New Jersey. Erected at cost of $3,116,000 on twenty-five acre site. Westfield Acres will house 514 families at base rents averaging $4.89 per room per month.

Milcor Type "B" Metal Base, Metal Lath, Channels, and Corner Bead used in construction.

(See standard detail No. 33)

UNIVERSITY HOMES, Atlanta, Georgia. Government's $2,592,000 housing project, where 675 families have modern, sanitary dwellings, at base rents averaging $5.11 per room per month.

Milcor Metal Lath, Channels, and Corner Bead used in construction.

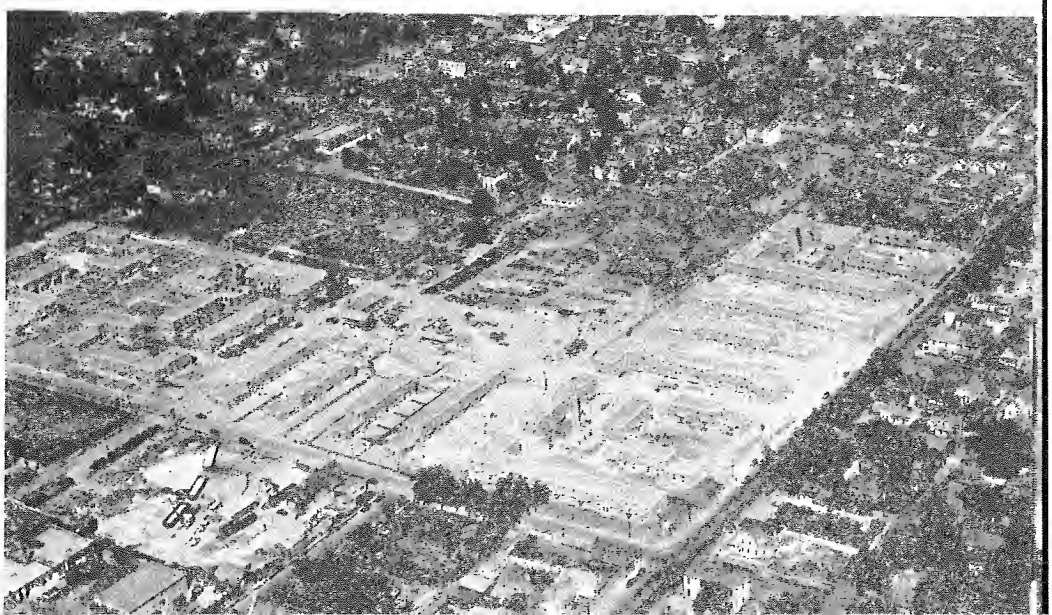


STANLEY S. HOLMES VILLAGE, Atlantic City, New Jersey. Erected at cost of $1,550,000 where 277 living units are provided at a base rent averaging $5.51 per room per month.

Milcor Metal Lath, Channels, and Corner Bead used in construction.

TECHWOOD HOMES, Government's $2,933,000 Housing Project in Atlanta, Georgia. Built on a twenty-five acre tract, 604 dwelling units are rented at a base rent averaging $5.52 per room per month.

Milcor Metal Lath, Channels, and Corner Bead used in construction.



LOGAN FONTENELLE HOMES, Omaha, Nebraska. $1,955,000 slum clearance, erected by the Government on a fifteen-acre site. Has 284 dwelling units available at base rent averaging $4.66 per room per month.

Milcor No. 657 Type "A" Metal Base and Special Expansion Door Casing used in construction.

(See standard detail No. 34)

PARKLAWN, Government's $2,600,000 housing project in Milwaukee, Wisconsin. Erected on a forty-two acre vacant area, where families have 518 living units at an average base rent of $5.38 per room per month.

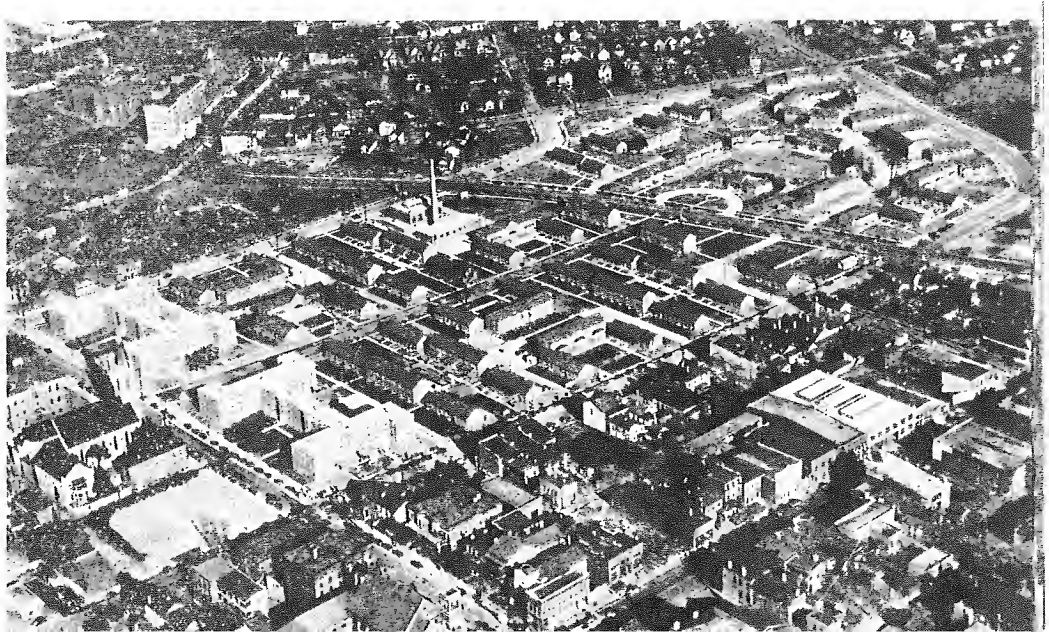
Milcor Type "A" Metal Base used in construction.

(See standard detail No. 34)

JULIA C. LATHROP HOMES, Government's $5,862,000 low-rent housing project in Chicago, Illinois. Here, on a thirty-five acre site, twenty-four fireproof buildings provide homes for 925 families at a base rent averaging $5.43 per room per month.

Milcor Type "B" Metal Base used in construction.

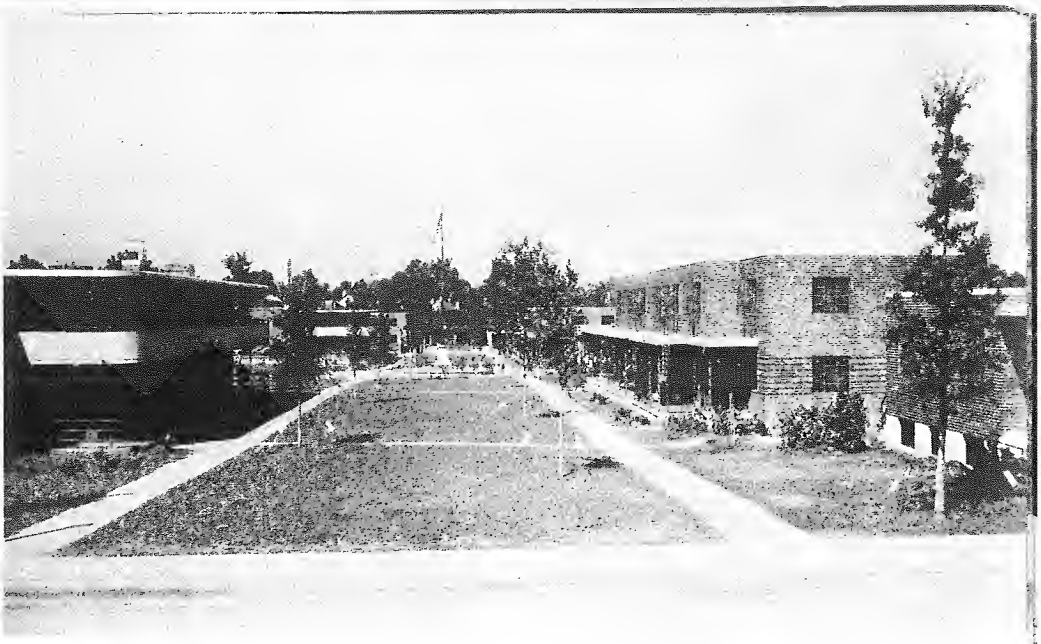
(See standard detail No. 33)



LAUDERDALE COURTS, second slum clearance project at Memphis, Tennessee. A $3,128,000 development on a twenty-six acre site—449 units renting for average of $4.61 per room per month.

Milcor Type "A" Metal Base used in construction.

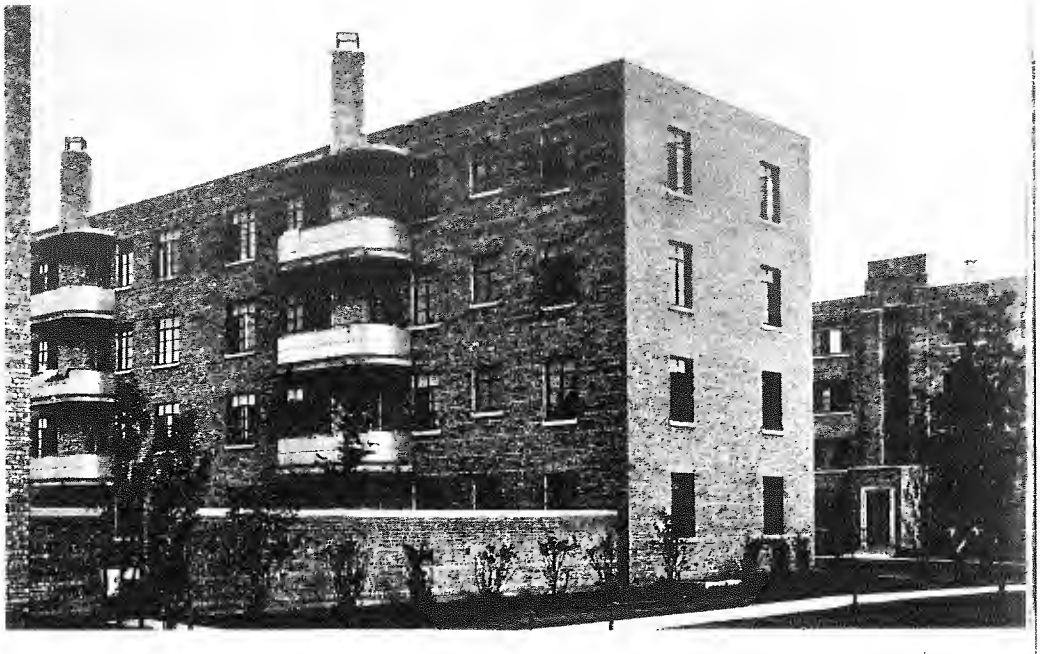
(See standard detail No. 34)



DIXIE HOMES, Government's $3,400,000 slum clearance at Memphis, Tennessee. Built on a forty-two acre site to afford 633 homes for average of $4.61 per room per month.

Milcor Type "A" Metal Base used in construction.

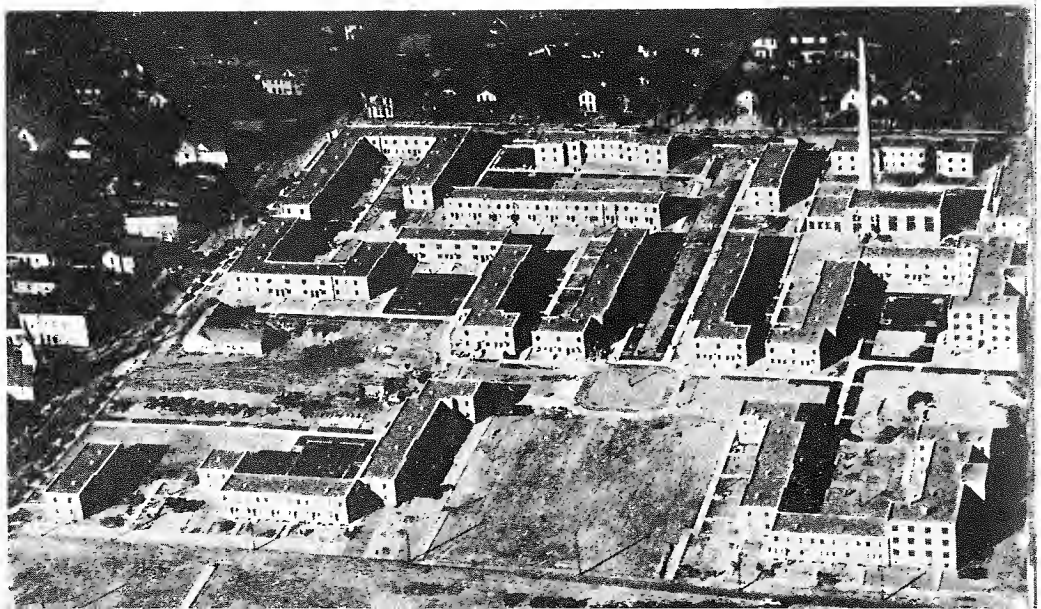
(See standard detail No. 34)



TRUMBULL PARK HOMES, Government's $3,038,000 low-cost housing development in Chicago. Will house 462 families at an average base rent of $5.43 per room per month. The fifty-five buildings cover 19 per cent of a twenty-one acre site.

Milcor Type "A" Metal Base used in construction.

(See standard detail No. 34)



BRAND WHITLOCK HOMES, Toledo's $2,000,000 slum clearance project. Built on a sixteen acre area — 264 units rent for average of $5.03 per room per month.

Milcor Type "A" Metal Base used in construction.

(See standard detail No. 34)

WESTLAKE HOUSING PROJECT

YOUNGSTOWN, OHIO

Architects
Scheible & Chaffer, (Youngstown)

General Contractors
Youngstown Builders Syndicate, (Youngstown)

Milcor Products Used
Special Base and Casings
Galv. 1¼" Strips
Special Partition Ends

SOUTH JAMAICA HOUSING PROJECT

SOUTH JAMAICA, N. Y.

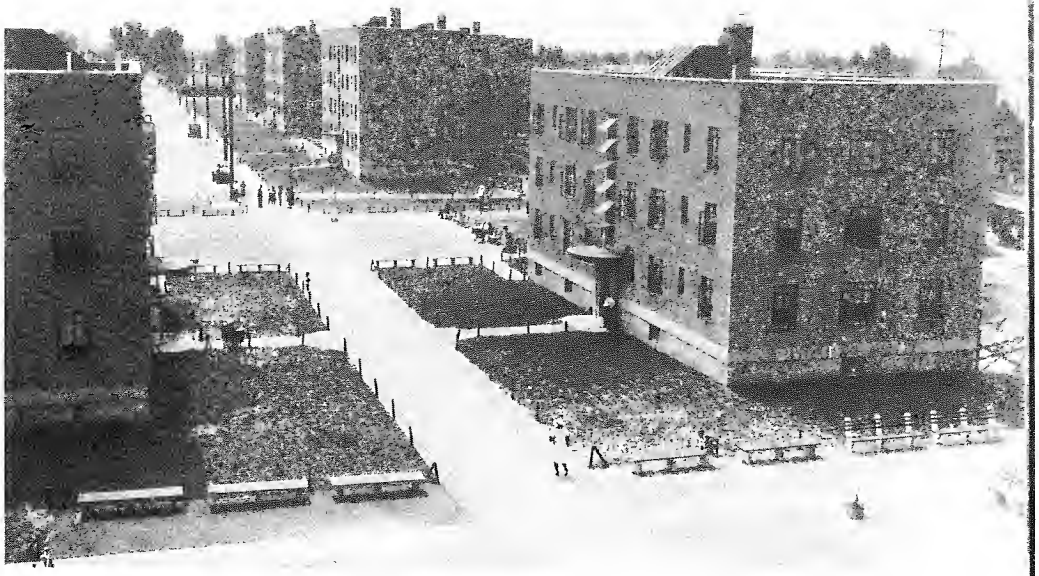
Architects
South Jamaica Associated Architects (N. Y. C.)

General Contractors
H. R. H. Constr. Co. (N. Y. C.)

Lathing
M. Symington & Co. (Long Island City)

Plastering
Associated Plastering Co. (N. Y. C.)

Milcor Products Used
Nos. 666 and 684 Metal Base
Solid Partition System
Netmesh Metal Lath
No. I Expansion Corner Bead
(See standard detail Nos. 26 and 35)



MULFORD HOUSING PROJECT

YONKERS, N. Y.

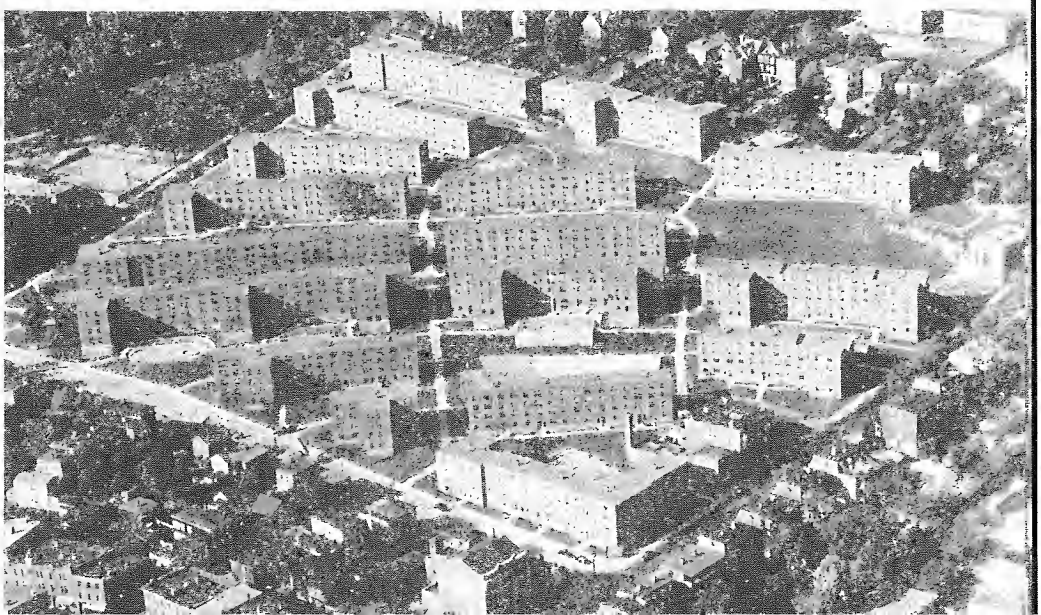
Architects
Louis F. Thorn & Wm. P. Katz (Yonkers)

General Contractors
Psaty & Fuhrman, Inc. (New York City)

Plastering
James F. Conroy Inc. (N. Y. C.)

Lathing
M. Symington & Co. (Long Island City, N. Y.)

Milcor Products Used
Milcor Solid Partition System
No. 666 Metal Base
No. I and No. 8 Bullnose Corner Bead
Netmesh Metal lath
(See standard detail No. 35)



JAMES WELDON JOHNSON HOMES

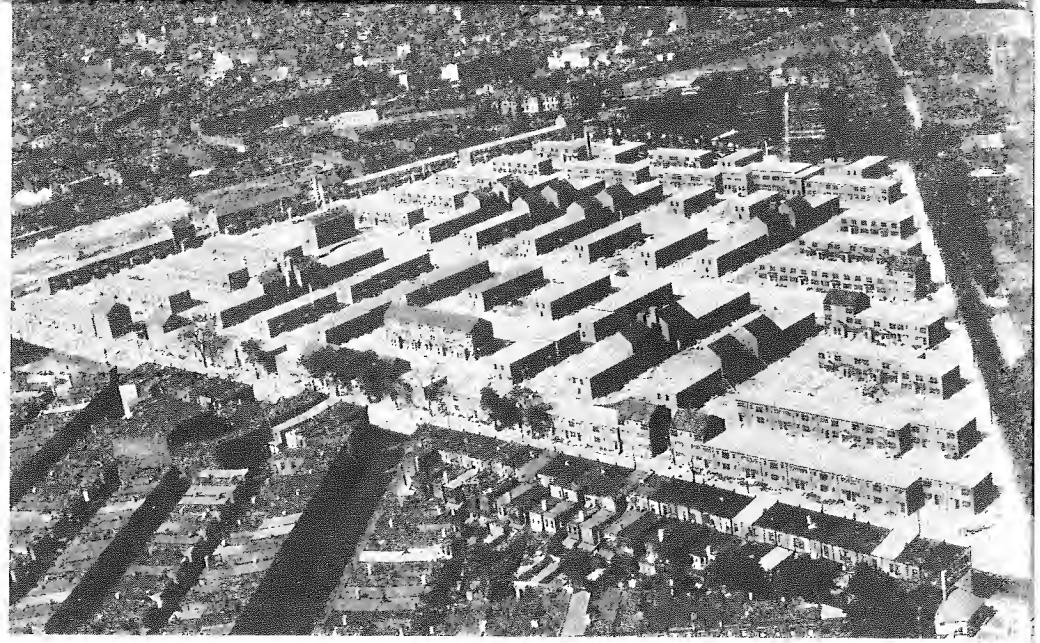
PHILADELPHIA, PA.

Associated Architects
W. Pope Barney, *Director*
Frank R. Watson, *Assistant Director*
Roy W. Banwell
Edmund B. Gilchrist
William H. Thompson

General Contractors
Wark & Co., (Philadelphia)

Lathing and Plastering
Wm. Armstrong & Sons, (Philadelphia)

Milcor Products Used
Solid Partition System
Nos. 681, 683 and 684 Metal Base
Netmesh, Kuehn's Specialmesh and Stayrib Metal Lath
(See standard detail No. 26)



ADRIAN TERRACE HOUSING PROJECT

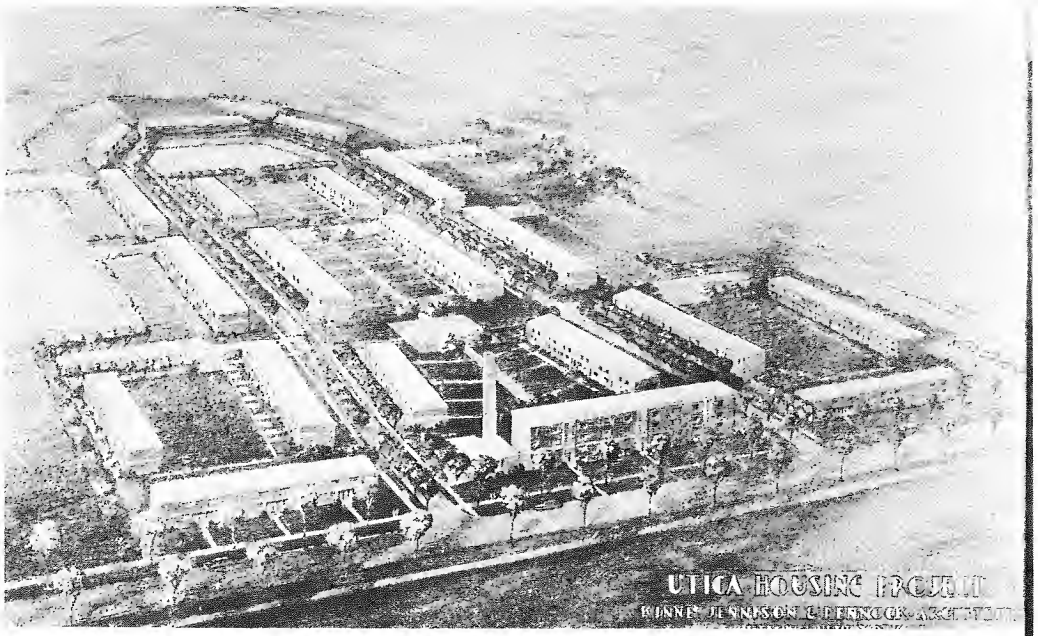
UTICA, N. Y.

Architects
Kinne-Jennison & Pennock, (Utica)

General Contractors
— Crow Constr. Co. (N. Y. C.)

Lathing and Plastering
Henderson-Johnson

Milcor Products Used
Nos. 681, 683 and 684 Base
Metal Lath
Corner Bead
Solid Partition System
(See standard detail No. 26)



BOOKER T. WASHINGTON APARTMENTS

COLUMBUS, GA.

Architects
Associated Architects of Columbus

General Contractors
Mion Constr. Co. (Atlanta, Ga.)

Plastering
J. R. Green Plastering Co. (Columbus)

Milcor Products Used
Nos. 681 and 684 Metal Base
No. 8 Bullnose Corner Bead
(See standard detail Nos. 26 and 35)

BRENTWOOD PARK HOUSING PROJECT

JACKSONVILLE, FLORIDA

Architects
Associated Architects of Jacksonville

General Contractors
J. A. Jones Construction Co.,
(Charlotte, N. C.)

Plastering
Hopton-Thompson Co., (Atlanta, Ga.)

Milcor Products Used
Nos. 691, 693 and 694 Metal Base
Stayrib and Netmesh Metal Lath
No. 12 Corner Bead
(See standard detail Nos. 30 and 32)

LINCOLN HOMES

TRENTON, N. J.

Chief Architects
P. L. Fowler Company

General Contractors
Karno-Smith Company

Milcor Products Used
Nos. 681, 683, 684 and 667 Metal Base
Solid Partition System
Steelkraft and Netmesh Metal Lath
(See standard detail Nos. 26 and 39)

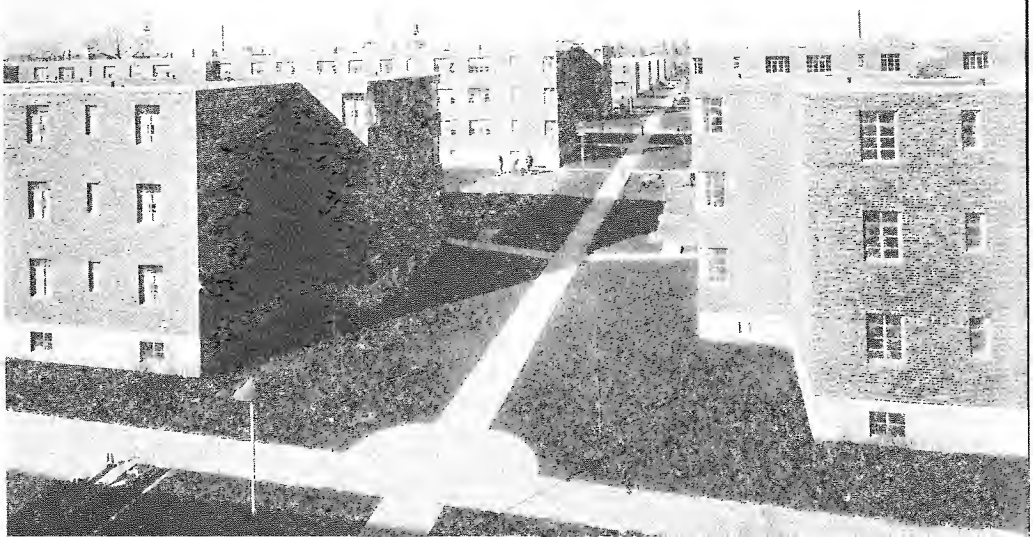
MAYOR DONNELLY HOMES

TRENTON, N. J.

Chief Architects
P. L. Fowler Company

General Contractors
Karno-Smith Company

Milcor Products Used
Nos. 681, 683, 684 and 667 Metal Base
(See standard detail Nos. 26 and 39)



CORPUS CHRISTI HOUSING PROJECTS

CORPUS CHRISTI, TEXAS

Architects
Nat W. Hardy, Robert Vogler, Westfall & Wade

General Contractors
Gilbert Falbo Company, (San Antonio)

Plastering
Thomas Bate, (Houston, Texas)

Lathing
Ollie Tope, (San Antonio)

Milcor Products Used
Solid Partition System
Smalmesh Metal Lath
No. 8 Exp. Bullnose Corner Bead
(See standard detail Nos. 21 and 35)

CAPITOL HOMES

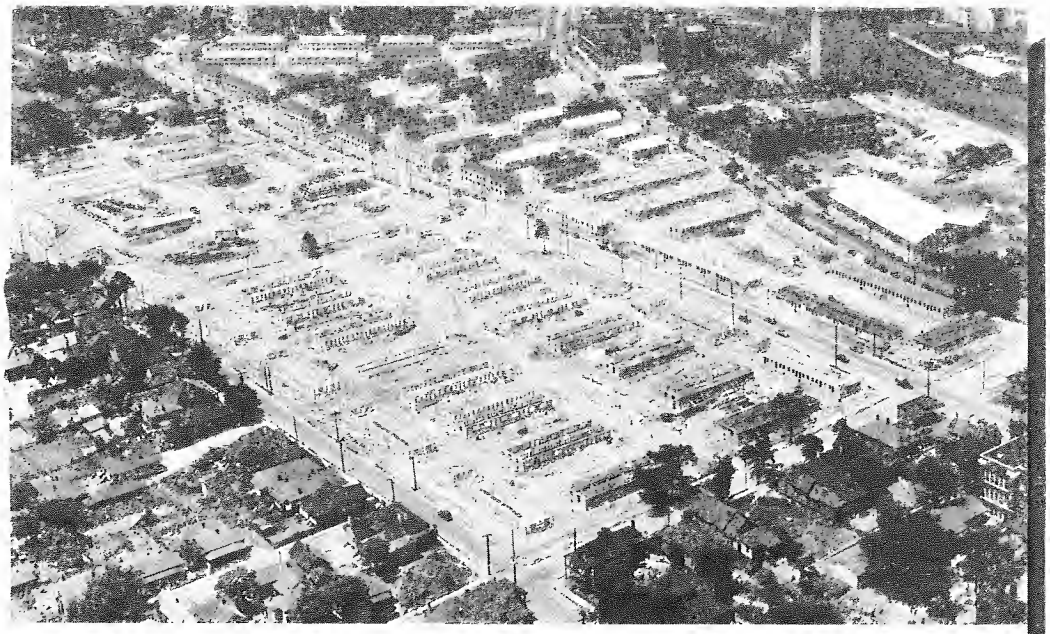
ATLANTA, GA.

Architects
Robert & Co. (Atlanta)

General Contractors
Virginia Engineering Co., (Newport News, Va.)

Lathing and Plastering
Hopton-Thompson Co., (Atlanta)

Milcor Products Used
No. 667 Metal Base
Solid Partition System
Metal Lath
No. 8 Bullnose and No. 12 Corner Bead
(See standard detail Nos. 35 and 39)



COLLEGE CREEK TERRACE

Architects
Earle S. Hardend, (Annapolis)

Lathing and Plastering—General Contractors — Samuel B. Dove

Milcor Products Used
Nos. 691 and 694 Metal Base
No. 8 Bullnose Corner Bead
(See standard detail Nos. 30 and 35)

MILCOR

SOLID PARTITION · FURRING SYSTEMS
SPECIAL METAL BASES

YOU BUY THE REST WHEN YOU BUY MILCOR PRODUCTS

- ★ LOW COST
- ★ SPACE SAVING
- ★ FIRE PROOF
- ★ SOUND RETARDING
- ★ SHOCK RESISTING

MILCOR STEEL COMPANY

MILWAUKEE, WISCONSIN. CANTON, OHIO. CHICAGO, ILL. KANSAS CITY, MO.
LA CROSSE, WIS. NEW YORK CITY. BALTIMORE, MD. ROCHESTER, N. Y. ATLANTA, GA.

MILCOR SOLID PARTITION SYSTEM

The Milcor Solid Partition is a two-way steel reinforced vertical slab of plaster, 2 inches thick. Steel channels running from floor to ceiling reinforce the partition vertically and hold the metal lath to which the plaster is applied. The lath itself reinforces the partition both horizontally and diagonally and at the same time functions as a plaster base. The solid partition resists as a unit physical impact, fire, wind, water, sound, and vibration.

1 CEILING ANGLE RUNNER

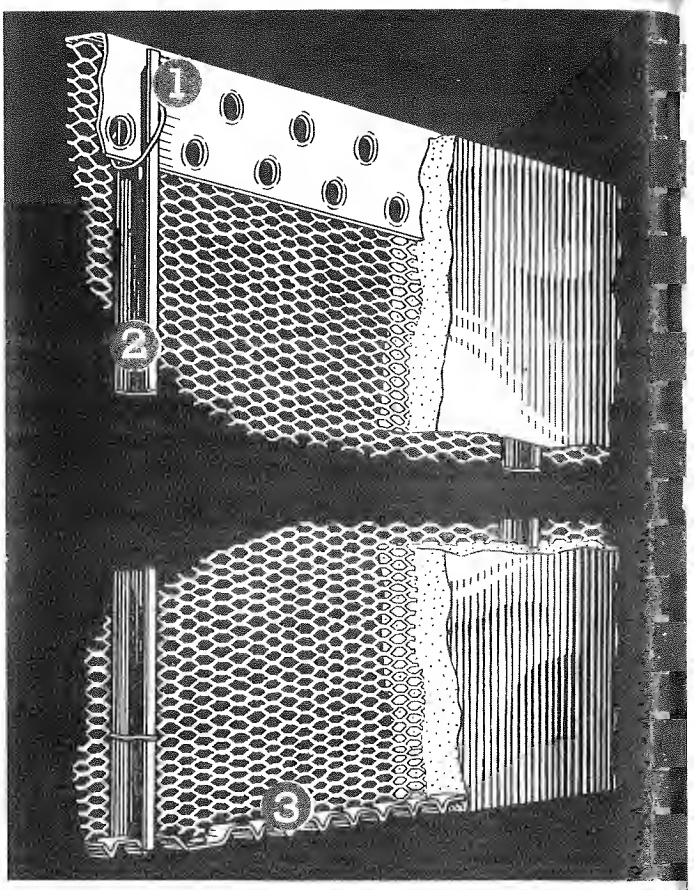
The Ceiling Runner is a 20 gauge angle with countersunk perforations on the long legs and slotted holes for nailing on the short legs. The perforations are staggered ½" apart. The countersinking forms a protrusion on one side which acts to hold the slotted stud in place without need of wiring until the lath has been erected.

2 SLOTTED CHANNEL STUD

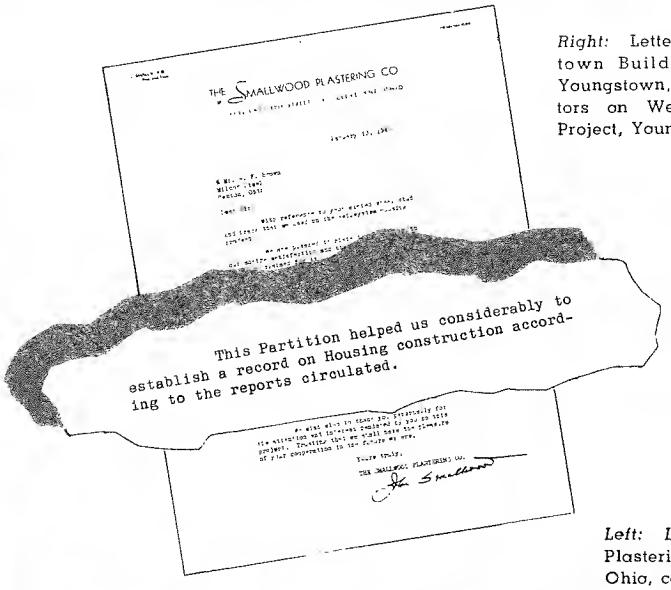
Slotted Channel Studs are furnished cut to length. The notch and slot at one end is easily slipped onto the Ceiling Runner. The stud is then dropped into one of the crimps in the floor runner. The slot is long enough to allow for nearly 2" variation in ceiling heights, making it unnecessary to provide splices or shoes. In addition to the fourteen standard lengths offered, studs can be supplied cut to exact lengths.

3 CRIMPED FLOOR RUNNER

The Floor Runner is an 18 gauge crimped strip, these crimps occurring every one inch and with flat spaces 1" long every 12" containing a slotted nail hole for attaching to the floor. When the stud is dropped into one of these crimps, it will not move in either direction.



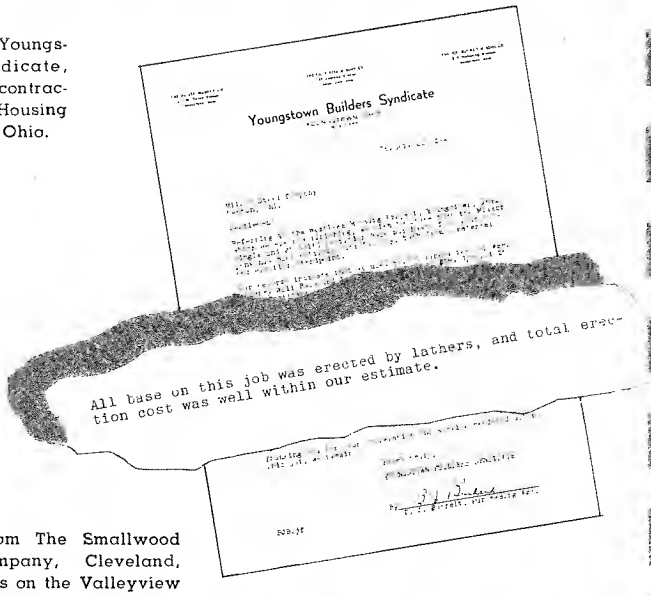
"ESTABLISHED A RECORD" AND "WELL WITHIN ESTIMATE" SAY USERS


THE SMALLWOOD PLASTERING CO

This Partition helped us considerably to establish a record on Housing construction according to the reports circulated.

Left: Letter from The Smallwood Plastering Company, Cleveland, Ohio, contractors on the Valleyview Housing Project.

Right: Letter from Youngstown Builders Syndicate, Youngstown, Ohio, contractors on Westlake Housing Project, Youngstown, Ohio.


Youngstown Builders Syndicate

All base on this job was erected by lathers, and total erection cost was well within our estimate.

8 Reasons

FOR USING SOLID PARTITIONS

LOW COST — Simplified erection speeds installation, making possible new low costs. The few necessary operations are quickly performed, even by workmen unfamiliar with this type of construction. Maintenance costs as well as original costs are reduced to a minimum.

SPACE SAVING — Reduction of unproductive space occupied by walls increases appreciably the usable area of the rooms which in turn enhances the value of the structure. Recently this space-saving made the difference between starting construction or abandonment of plans on a large apartment in Milwaukee, Wisconsin.

FIRE RESISTANCE — A two-hour fire rating has been given the 2-inch Solid Partition (plastered with wood fibred gypsum) by the National Bureau of Standards. Reports by the Bureau show remarkable resistance in both fire and hose stream tests.

SOUND RETARDING — Under ordinary conditions, 2-inch Solid Partitions are effective barriers to sound. The fewer openings in the partition for doors and windows, the greater the sound insulation value. Consistent specification in hotel and hospital construction confirms its sound-retardant qualities.

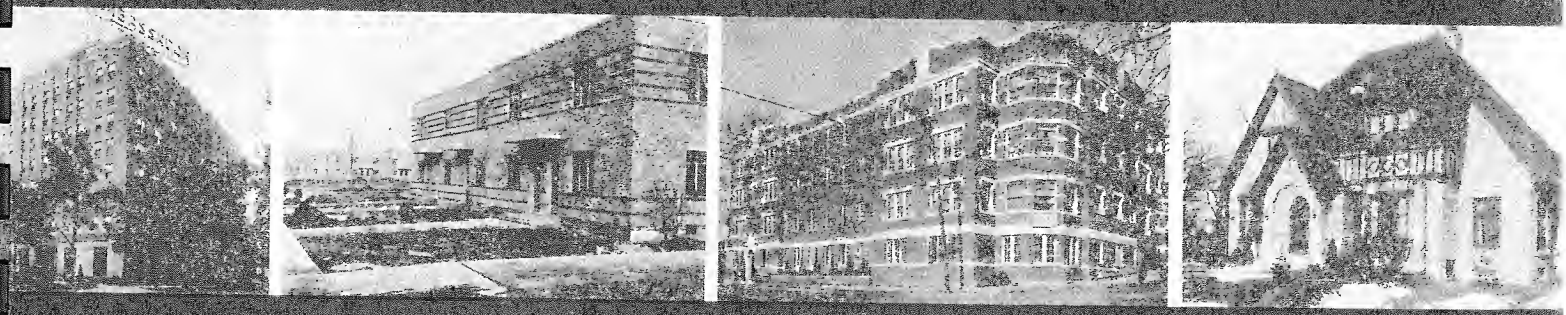
WEIGHT REDUCTION — The substantial reduction in dead weight of walls made possible by 2-inch Solid Partitions effects a marked decrease in costs of supporting structure. This is an important factor and should be given careful consideration.

SHOCK RESISTANCE — Solid Partitions resist impact, vibration, or cracking more effectively than any other type of partition because of unique reinforced construction. This is especially desirable in schools and other public buildings.

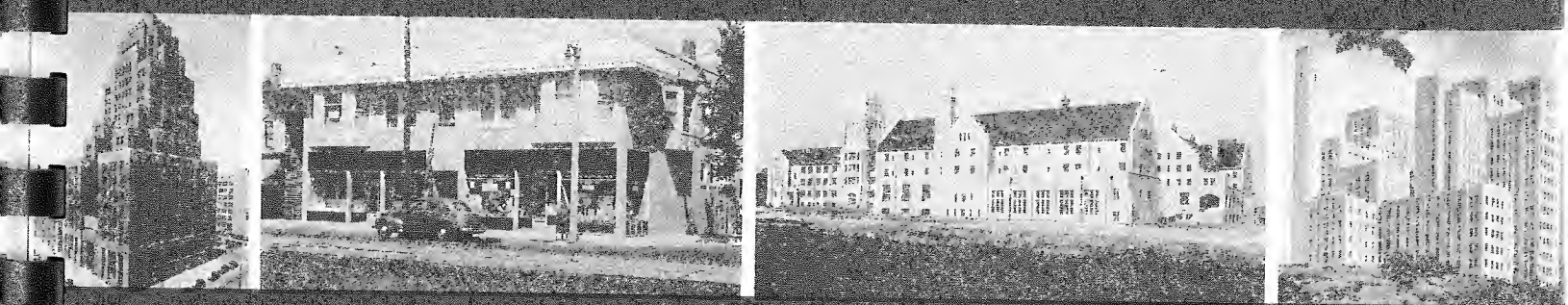
ADAPTABILITY — The Milcor Solid Partition System is adaptable to almost every type of structure. Savings are usually in proportion to the size of the building. For construction of a permanent nature it is unexcelled.

PERMANENCE—DURABILITY — Solid Partitions retain their strength indefinitely. They are impregnable to rodents, fungi, termites, and similar factors of deterioration which affect other types of wall construction.

2 INCH SOLID PARTITIONS IDEALLY SUITED FO



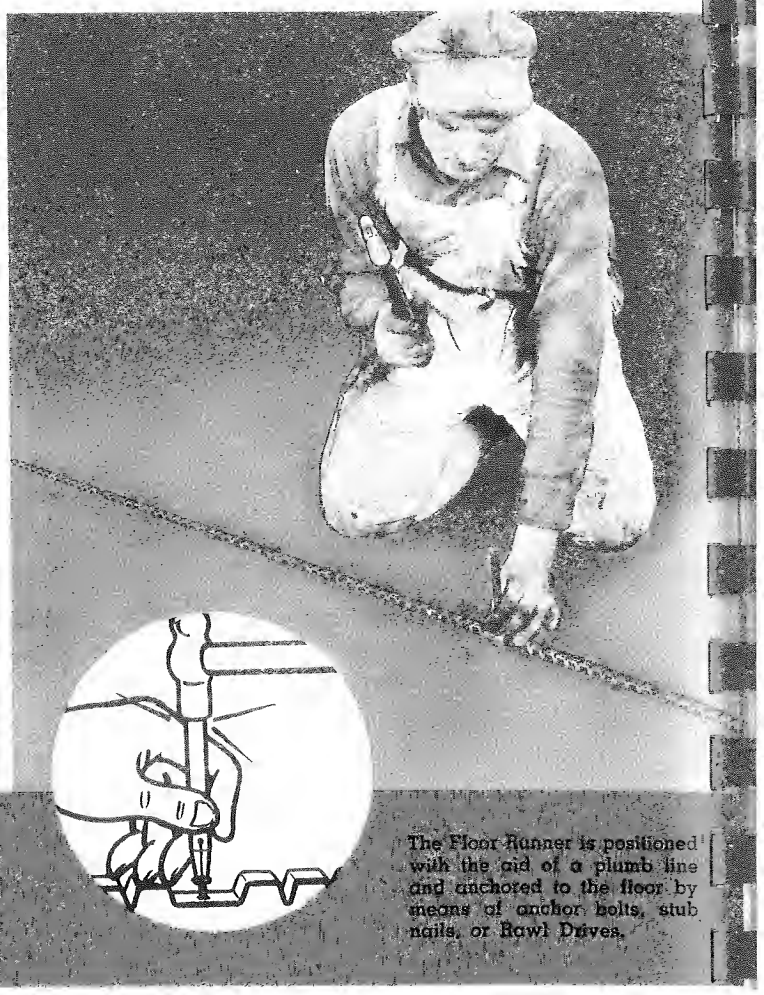
HOTELS HOUSING APARTMENTS HOMES



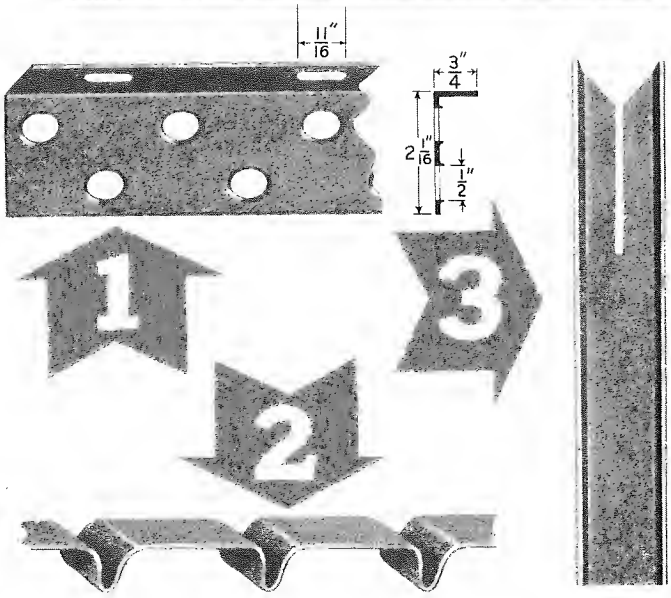
OFFICE BUILDINGS STORES SCHOOLS HOSPITALS

THE *Fastest known method* FROM NOTHIN

The Ceiling Runner is fastened to the ceiling by means of anchor bolts, stub nails, or Rawl Drives.



The Floor Runner is positioned with the aid of a plumb line and anchored to the floor by means of anchor bolts, stub nails, or Rawl Drives.



Only 3 UNITS TO HANDLE

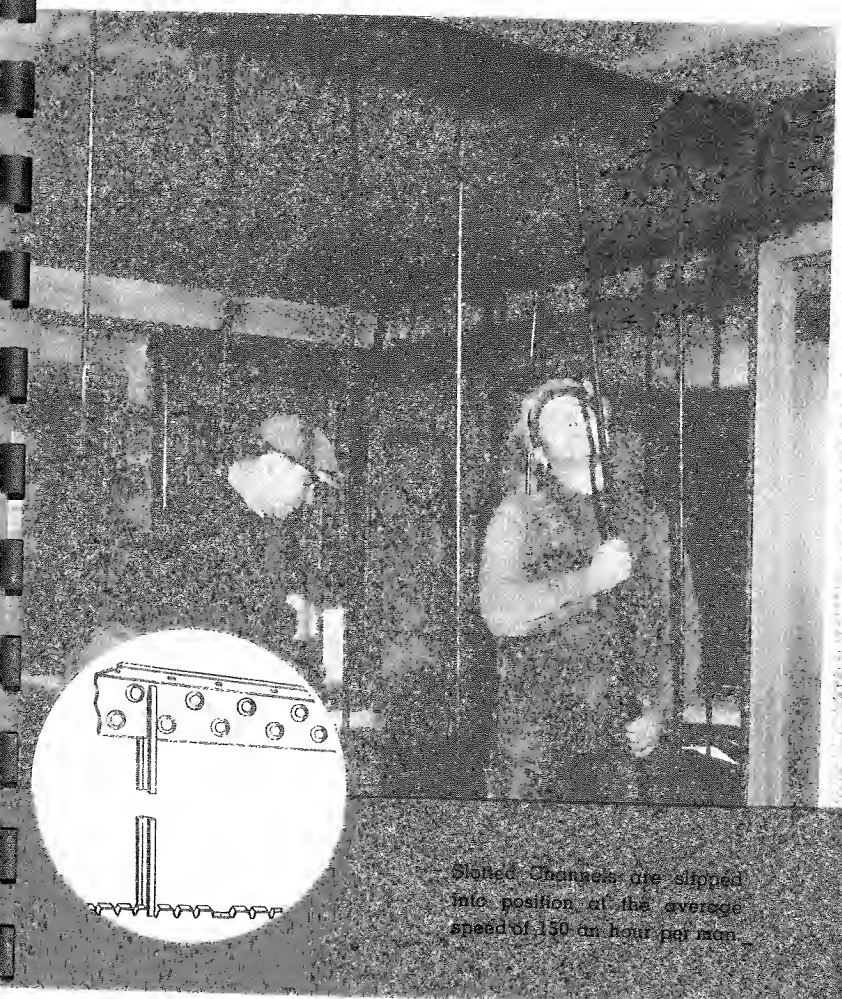
1 CEILING RUNNER has countersunk perforations on the wide flange which forms a protrusion on one side. These protrusions hold the slotted studs in position. The studs may be wired at the time the lath is wired.

2 FLOOR RUNNER has crimping occurring one inch on centers with one inch flat nailing space every 12 inches. Designed for rapid installation. No wiring, no cutting or adjusting, no shoes to be attached, no holes for studs to be drilled in either floor or ceiling. (See special bases on pages 9, 10, 11, and 13.)

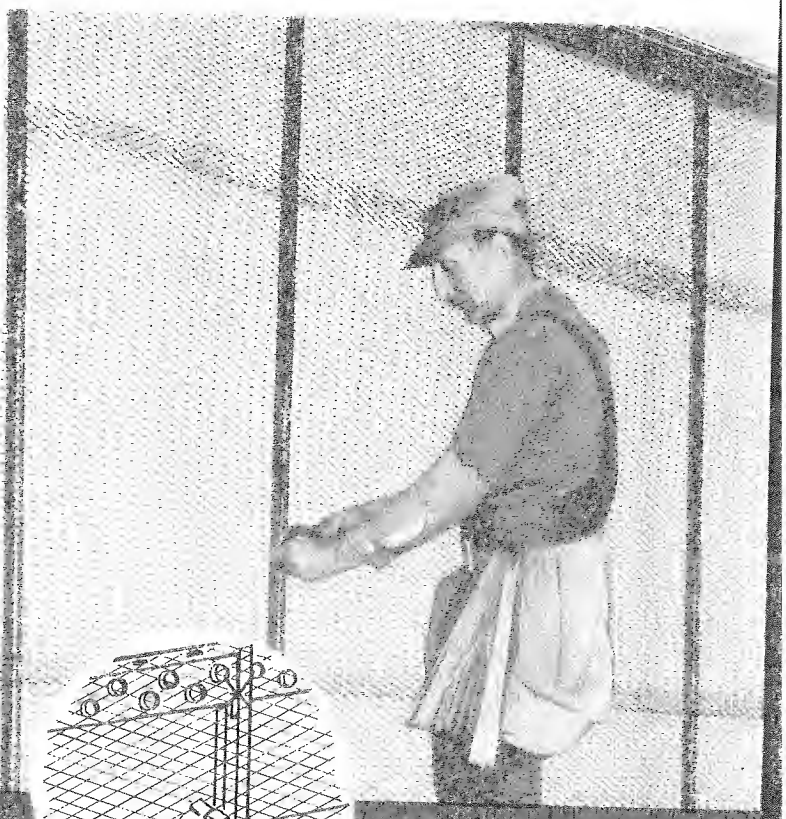
3 SLOTTED CHANNEL STUDS are furnished cut to length. Slotted end is slipped into Ceiling Runner and the other end is dropped into one of the crimps in the Floor Runner. The slot is deep enough to allow for nearly 2-inch variation in ceiling heights, eliminating splices or shoes.

MILCOR SOLID PARTITIONS

TO SUBSTANTIALLY CONSTRUCTED WALL



Slotted Channels are slipped into position at the average speed of 150 an hour per man.



Standard Sheets of Metal Lath are quickly wired to the studs. Wiring completed in one operation with ordinary tie wire.

LENGTHS AND SHIPPING WEIGHTS

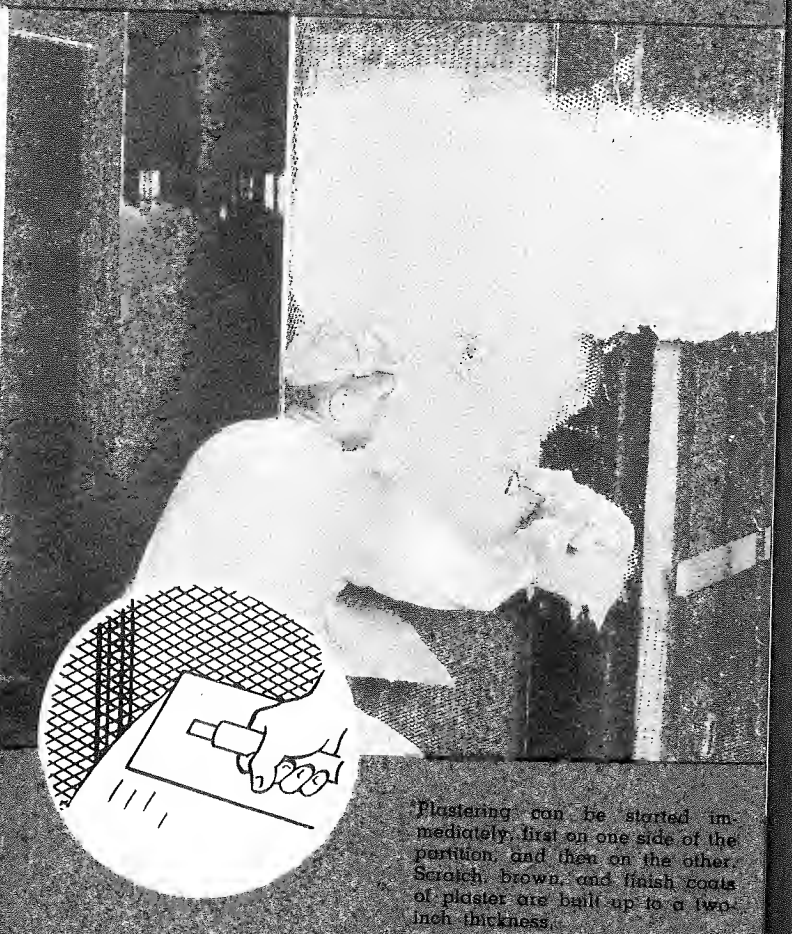
¾" C. R. NOTCHED STUD PAINTED
Shipping Weight, Lbs. Per Stud

Length of Stud	Weight
6 Feet	1.62
6 Feet, 6 Inches	1.75
7 Feet	1.89
7 Feet, 6 Inches	2.02
8 Feet	2.16
8 Feet, 6 Inches	2.30
9 Feet	2.43
9 Feet, 6 Inches	2.56
10 Feet	2.76
10 Feet, 6 Inches	2.83
11 Feet	2.97
11 Feet, 6 Inches	3.10
12 Feet	3.24
12 Feet, 6 Inches	3.37

Studs can be cut to exact lengths on special order.

CEILING RUNNER
Shipping Weight Per 1,000 Feet
Standard Length 10'—20 Ga. Ptd. ..... 350 lbs.

FLOOR RUNNER
Shipping Weight Per 1,000 Feet
Standard Length 8' 4" — 18 Ga. Ptd. ..... 133 lbs.



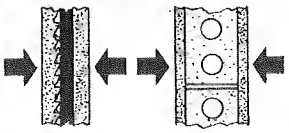
Plastering can be started immediately, first on one side of the partition, and then on the other. Scratch, brown, and finish coats of plaster are built up to a two-inch thickness.

THE BEST AT LOWEST COST

EXCLUSIVE FEATURES OF

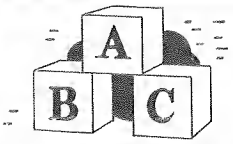
MULTIPLE SAVINGS IN CONSTRUCTION COSTS

When one man can erect studs at the amazing speed of 150 per hour, on the average, erection costs are cut materially. In addition to this saving, the Milcor System effects other savings on Plumbing, Electric, and Carpenter work. Clean up expense is practically eliminated.



MAXIMUM DEGREE OF SPACE SAVING

A 2-inch Solid Partition occupies only 3.93% of the space in a room of 224 square feet, while a 4½-inch partition occupies 10.85% of the space. At 50c per cubic foot (ceiling height 10 feet) the Solid Partition saves $56.70 or $77.90 over the 4½-inch partition. (Same size room.)

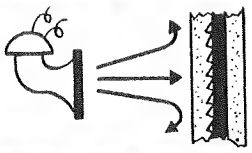


SIMPLY AND QUICKLY ERECTED

Using only three simple, prefabricated members, lathers work fast. There are no bulky materials in the way to impede rapid progress. Each operation follows the preceding one in quick succession. Walls are completed in record time.

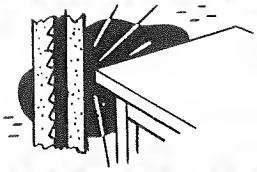
TWO-HOUR FIRE RATING

The National Bureau of Standards has accredited a full two-hour fire rating to two-inch Solid Plaster Partitions when wood fibred gypsum has been used as the plastering medium. Even after three and four hours of fire exposures there was an absence of spalls and serious plaster cracking.



HIGH RATING FOR SOUND RESISTANCE

Solid Partitions have been rated 46 decibels by the United States Bureau of Standards. This rating is superior to any but the heaviest masonry wall type of construction. The sound insulation valve of Milcor Solid Partitions is adequate for all but highly specialized construction.



HIGHLY RESISTANT TO SHOCK AND CRACKING

Whether the shock is general, such as an earthquake tremor, or is localized, Solid Partitions have maximum resistance. Reinforced two ways and firmly attached to wall and ceiling, they become monolithic slabs which resist both impact and pull.

SANITATION — AN IMPORTANT FEATURE

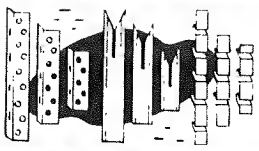
The unexcelled sanitation of this type of partition makes it ideal for hospitals, schools, and similar institutional buildings. There are no seams or joints to collect dust or harbor bacteria-laden vermin. Rodents cannot gnaw their way into or breed in the 2-inch Solid Partition.

RAPID INSTALLATION DUE TO PERFECTED DESIGN RESU

MILCOR SOLID PARTITIONS

FURNISHED IN LENGTHS TO MEET ALL REQUIREMENTS

There are fourteen standard lengths of Slotted Channel Studs, any of which are furnished cut to exact dimensions. See page 5 for sizes and shipping weights of standard lengths. Ceiling Runners come in 10 foot lengths and Floor Runners in 8 foot, 4 inch lengths.

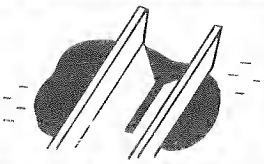


METAL BASES FOR ALL TYPES OF FLOORING

Specially designed, one-piece and two-piece Milcor Metal Bases with built-in floor runner are available for use with wood, linoleum, mastic, or composition flooring. For dimensions, cross section drawings, and illustrations of the various base designs, refer to pages 8, 9, 10, 11, and 12.

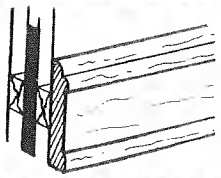
PATENTED SLOTTED STUDS — TROUBLE-PROOF

The strong, Slotted Channel Studs are exclusive in design. Unique fabrication permits rapid, trouble-free installation. Placing the studs in position is done in a single operation by one man. The construction of the Channel Studs is such that they can be inserted in the floor runner in record time.



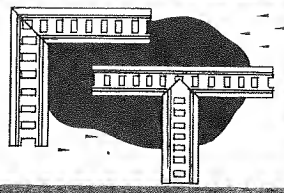
ADAPTABLE TO WOOD TRIM

Wood Trim may be used with the 2-inch Solid Partition. The trim is nailed to wood grounds installed prior to plastering. For detailed information regarding the use of wood trim with Milcor Solid Partitions refer to page 8.



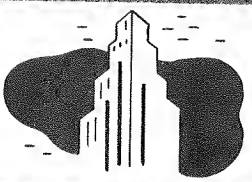
USED WITH MILCOR METAL TRIM

Practical, attractive Milcor Metal Trim is co-ordinated with the Solid Partition System and can be supplied as construction progresses. Timed delivery lessens confusion and damage during erection. The Milcor line of Metal Trim is the finest and most complete available.



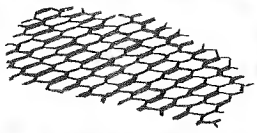
FINEST TYPE OF CONSTRUCTION FOR PERMANENCE

Plaster on Metal Lath is accepted as excellent construction for long, trouble-free service. Milcor Solid Partitions, reinforced two ways and with two solid inches of plaster thickness, provide the strongest, most durable walls used in regular construction.



MILCOR METAL LATH USED AS PLASTER KEY

Application of sheets of Milcor Metal Lath may immediately follow the placing of the Channel Studs. Tie wire is used to secure the Metal Lath to the Studs. Milcor Metal Lath is recognized throughout the architectural profession for its perfected design and manufacture.



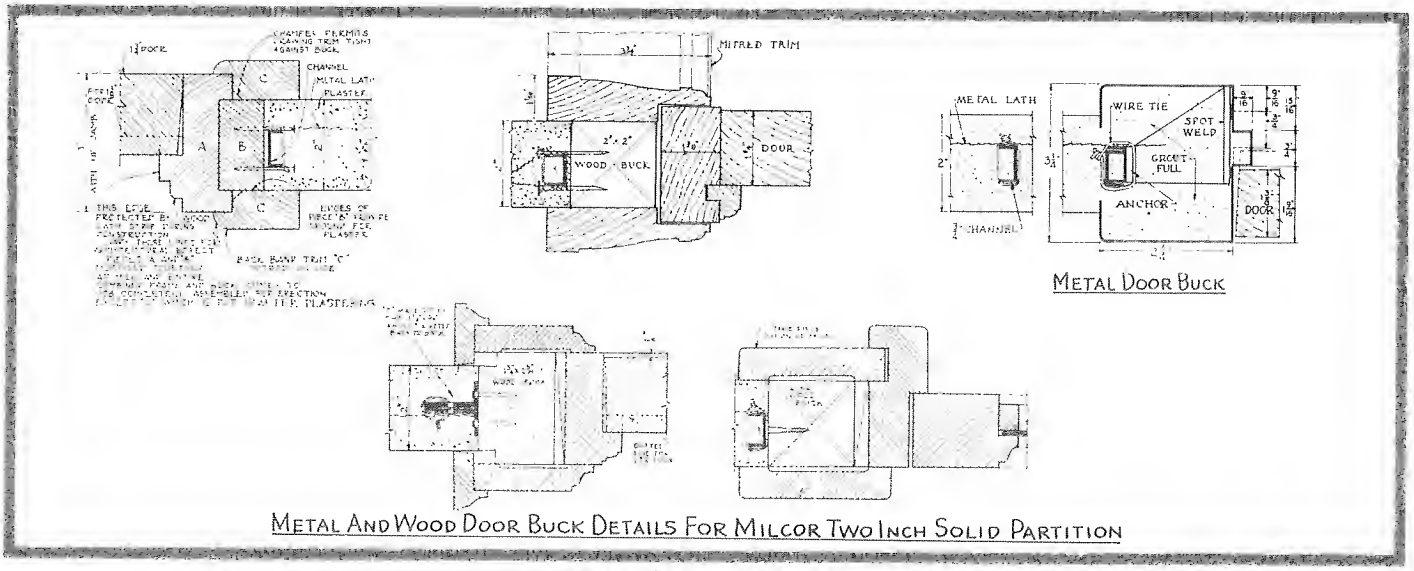
TS IN LOW COST PER SQUARE YARD OF FINISHED WALL

DOOR BUCKS AND ELECTRICAL EQUIPMENT WITH SOLID PARTITIONS

MILCOR SOLID PARTITIONS

(See Details of Metal Buck and Framing on Page 12)

Door Bucks of either wood or metal are used with the Milcor Solid Partition System. Metal Bucks, manufactured especially for Solid Partitions, are generally available and prove exceptionally satisfactory for completely fireproof construction. Both Metal Bucks and Wood Bucks are braced to insure a perfect fitting door. Wood Bucks are frequently used, however, and therefore a number of different types of construction with wood trim are shown below. Obviously a secure fastening of the nearest channel stud to the Wood Buck is necessary, and the stud should be anchored to floor and ceiling. Wood trim is applied after plastering.



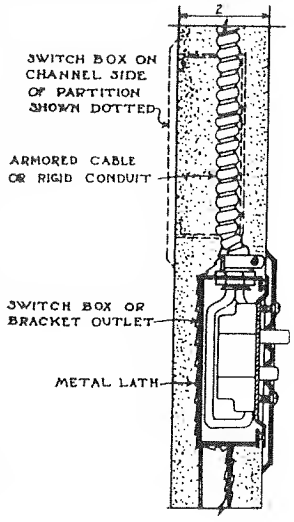
METAL DOOR BUCK

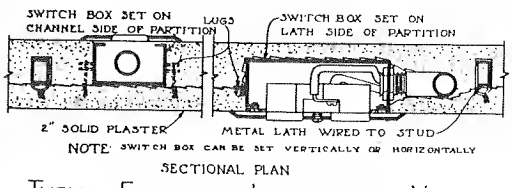
METAL AND WOOD DOOR BUCK DETAILS FOR MILCOR TWO INCH SOLID PARTITION

STANDARD ELECTRICAL EQUIPMENT FOR SOLID PARTITIONS

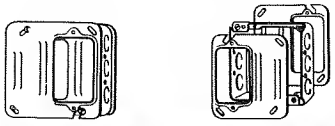
Shallow electrical devices are manufactured especially for Solid Partition Construction. Architects and Builders should be sure to specify shallow devices to assure entirely satisfactory electrical installation.

Typical electrical installation views are shown at the immediate right and directly below.

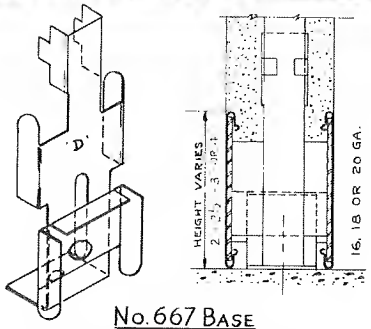




TYPICAL ELECTRICAL INSTALLATION VIEW.

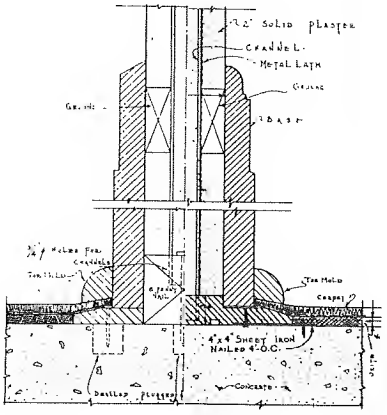


DOUBLE END OUTLET BOX FOR USE WITH SOLID PARTITION

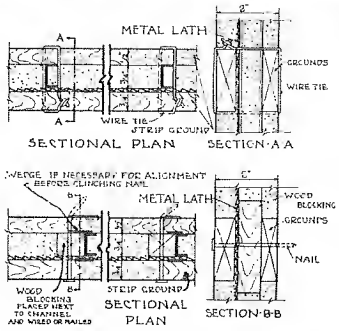


No. 667 BASE FOR 2" PLASTER PARTITION

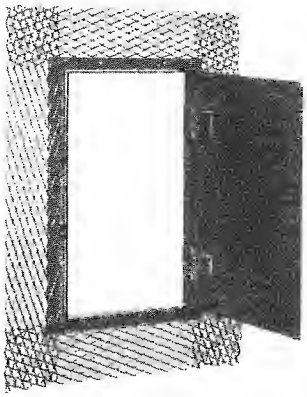
BASE CLIPS NAILED TO FLOOR AT INTERVALS CORRESPONDING WITH STUD SPACING. COMBINATION METAL BASE PROVIDING STUD ANCHORAGE, PLASTER GROUNDS, AND FINISH TRIM IN ONE UNIT.



WOOD BASE AND CARPET STRIP DETAILS

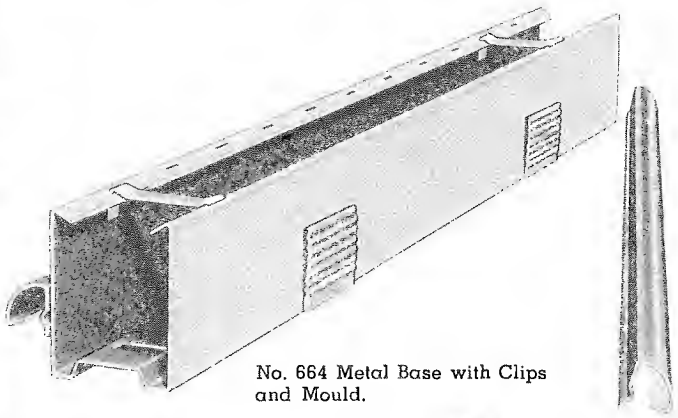


TWO METHODS OF ATTACHING STRIP GROUNDS FOR SOLID PARTITIONS.

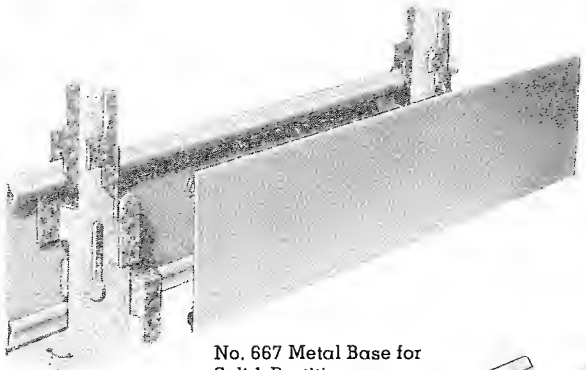


MILCOR ACCESS DOOR WITH 20 GAUGE EXPANSION WINGS.

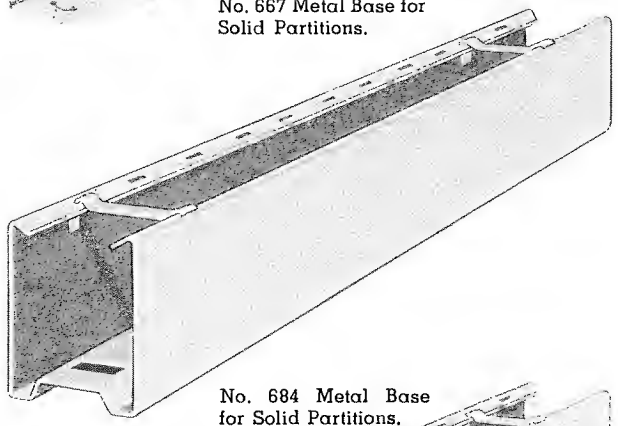
COMBINATION METAL BASES AND FLOOR RUNNERS FOR USE WITH SOLID PARTITIONS



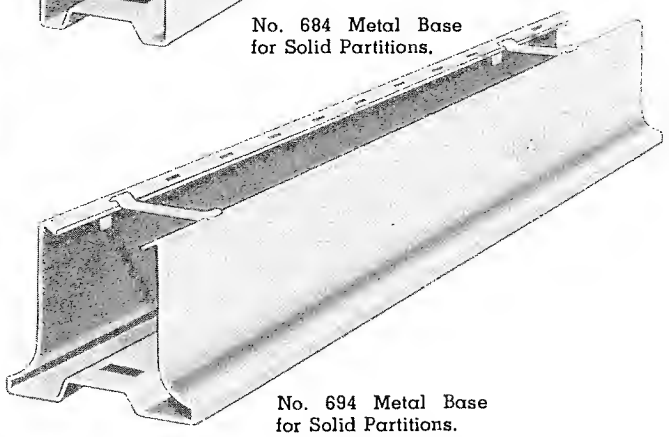
No. 664 Metal Base with Clips and Mould.



No. 667 Metal Base for Solid Partitions.



No. 684 Metal Base for Solid Partitions.



No. 694 Metal Base for Solid Partitions.

SUGGESTED SPECIFICATIONS

NON-BEARING 2-INCH SOLID PLASTER PARTITIONS

Wherever 2" solid plaster partitions are called for in the plans and specifications, the furring system shall be the Milcor Solid Partition Furring System as manufactured by the Milcor Steel Company. This system consists of a 20-gauge Ceiling Runner Angle (painted) which is securely attached to the ceiling with the 2" leg down, correctly aligned to receive the Milcor Stud.

Wherever the ceiling above is concrete, the Milcor Ceiling Runner Angle is attached by concrete stub nails at 12" centers direct to the soffit of the slab. Milcor 18 Gauge Floor Runner or Milcor Combination Metal Bases and Floor Runners shall be used at the floor to receive the Milcor Stud, aligned properly and fastened at 12" centers with concrete stub nails.

Milcor Partition Studs shall be ¾" C. R. (painted) 276-lb. Channels spaced not to exceed 12" centers. The Milcor Stud has one end slotted and the leg of the Ceiling Runner is engaged in the slot and the bottom of the stud is dropped into the "V" in the Milcor Runner or Milcor Combination Metal Bases and Floor Runners. These studs shall be placed vertically and shall be held so temporarily by the flanged holes in ceiling runner leg.

Milcor 2.5-lb. painted Netmesh Lath shall be tied across one side of the studs with 18-gauge galvanized tie wire in accordance with approved lathing practice. The edge of the top sheet of lath—adjacent to the Ceiling Runner leg—shall be wired to this runner leg at each midway point between the studs to prevent sagging of lath between studs at the ceiling. Also, one tie shall be made at each stud at the point where stud engages the Ceiling Runner—this tie to engage stud, lath, and Ceiling Runner. Also, one tie shall be placed midway between studs engaging bottom edge of lath and the Floor Runner.

Exterior Wall Furring and Lathing

Wherever exterior wall furring is required by plans or specifications, the furring system shall be Milcor Exterior Wall Furring System consisting of 20-gauge black Ceiling Runner Angle, 18-gauge Floor Runner Strip, and ¾" C. R. 276-lb. Furring Studs assembled as specified under 2" Solid Partition Furring. (All black steel exterior wall furring materials to be shop coated with one coat of black asphaltum paint.)

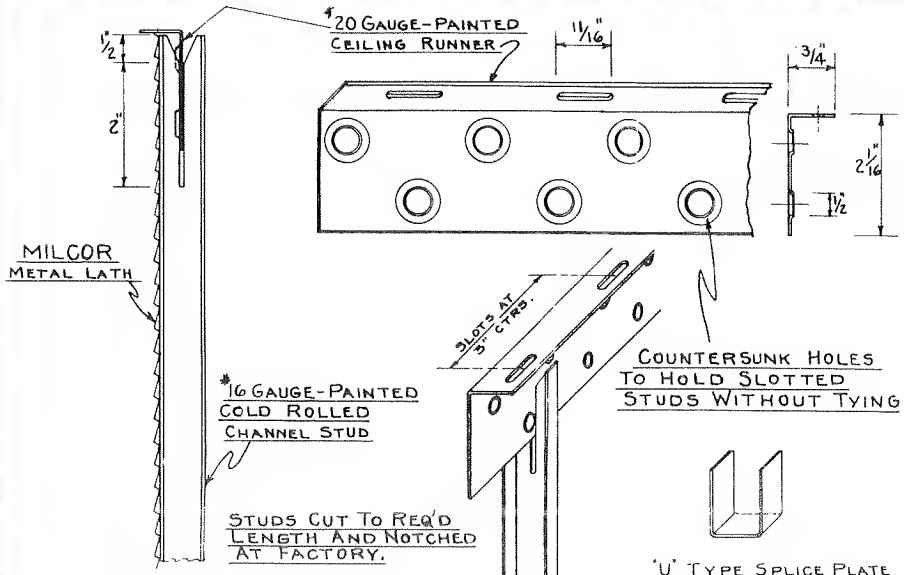
The following size of channel studs are recommended for various ceiling heights of free standing walls:

¾" C. R. Channels Painted up to 9' 0" Maximum
1" C. R. Channels Painted from 9' to 11'
1½" C. R. Channels Painted from 11' to 15'
2" C. R. Channels Painted from 15' to 20'

Corner Beads shall be Milcor No. 1 Expansion Bead, 26-Gauge Galvanized, and shall be used at all exterior angles.

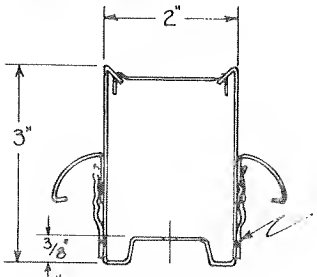
COMBINATION METAL BASES AND FLOOR RUNNERS Nos. 664 and 667

MILCOR SOLID PARTITIONS



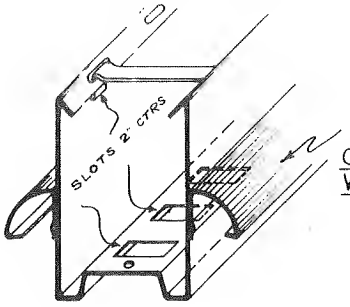
*664 BASE WITH ADJUSTABLE MOULD FOR VARIOUS FLOOR THICKNESSES, ACTING AS BASE, PLASTER SCREED, AND SUPPORT FOR STUDS.

No. 664 METAL BASE PATENT NO 2,203,119



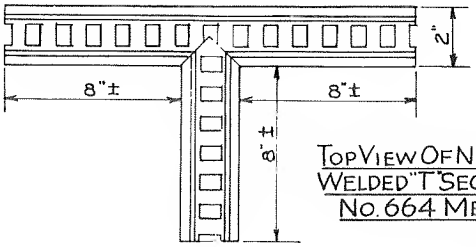
2 INCH WIDE CLIPS WELDED 18" O.C.

*664 METAL BASE FOR SOLID PARTITIONS

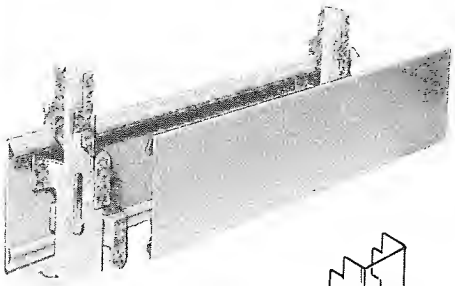


CLIP ON MOULD AFTER WOOD FLOOR IS ON

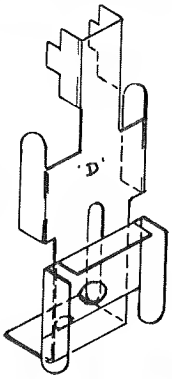
ISOMETRIC



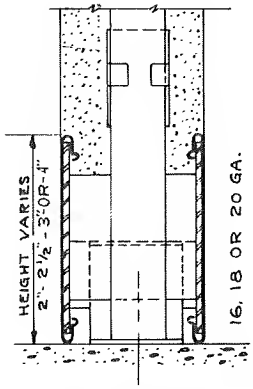
TOP VIEW OF NOTCHED AND WELDED "T" SECTION FOR NO. 664 METAL BASE.



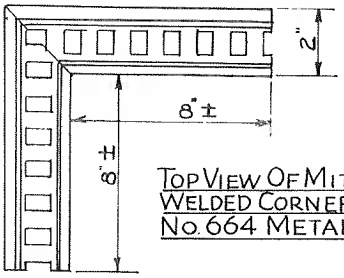
No. 667 - METAL BASE



ISOMETRIC VIEW HOLD DOWN CLIP (ONE PIECE RIVETED SLIP JOINT FOR ADJUSTMENT TO FLOOR SLAB VARIATION)

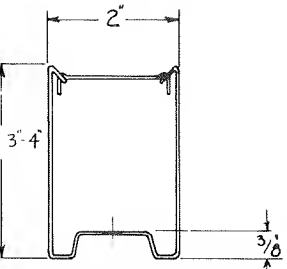


No. 667 - METAL BASE FOR 2" PLASTER PARTITION

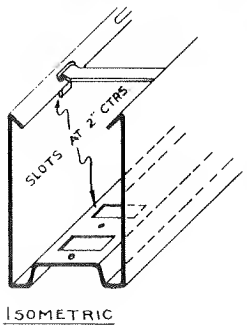


TOP VIEW OF MITRED AND WELDED CORNERS FOR NO. 664 METAL BASE

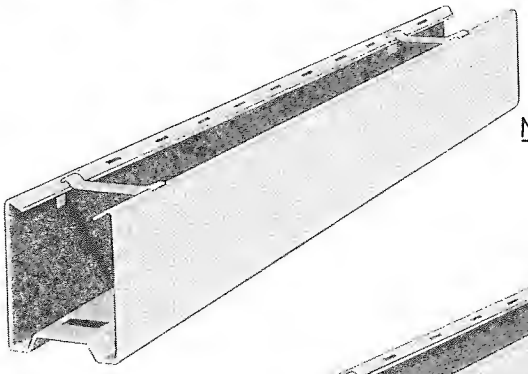
COMBINATION METAL BASES AND FLOOR RUNNERS Nos. 684 and 694



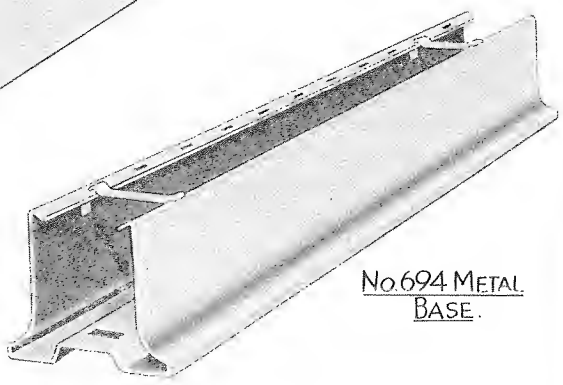
*684 METAL BASE
OR SOLID PARTITIONS
ILABLE IN 16, 18, & 20 GA.



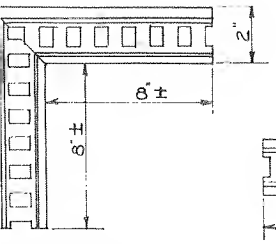
ISOMETRIC



No. 684 METAL BASE

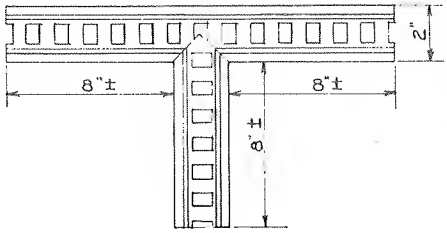


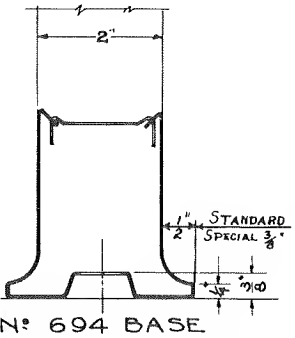
No. 694 METAL BASE.



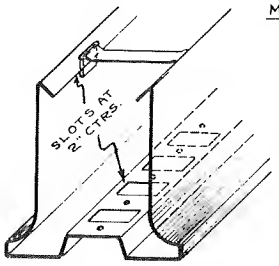
ABOVE
VIEW OF MITRED AND
LDED CORNERS FOR No.
684 METAL BASE.

BELOW
TOP VIEW OF NOTCHED
AND WELDED "T" SECTION
FOR No. 684 METAL BASE

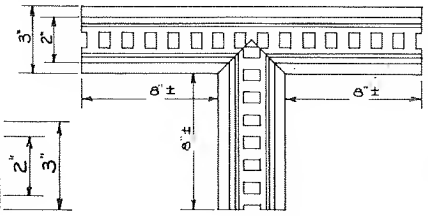


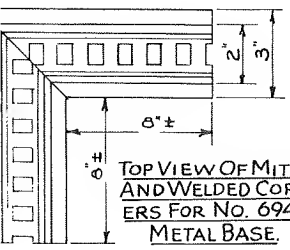


Nº 694 BASE
T 2" SOLID PARTITIONS.



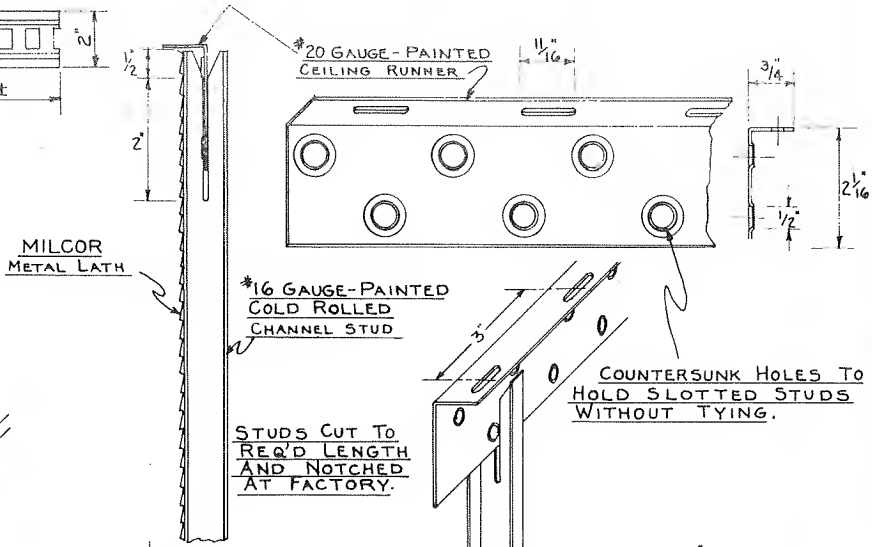
No. 694 METAL BASE. FOR SOLID PARTITIONS

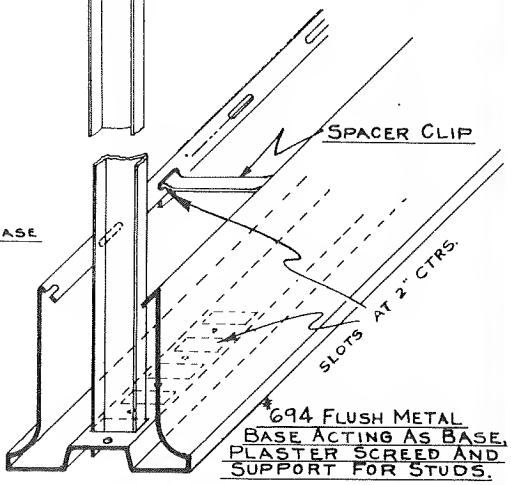




TOP VIEW OF MITRED AND WELDED CORNERS FOR No. 694 METAL BASE.

TOP VIEW OF NOTCHED AND WELDED "T" SECTION FOR No. 694 METAL BASE.



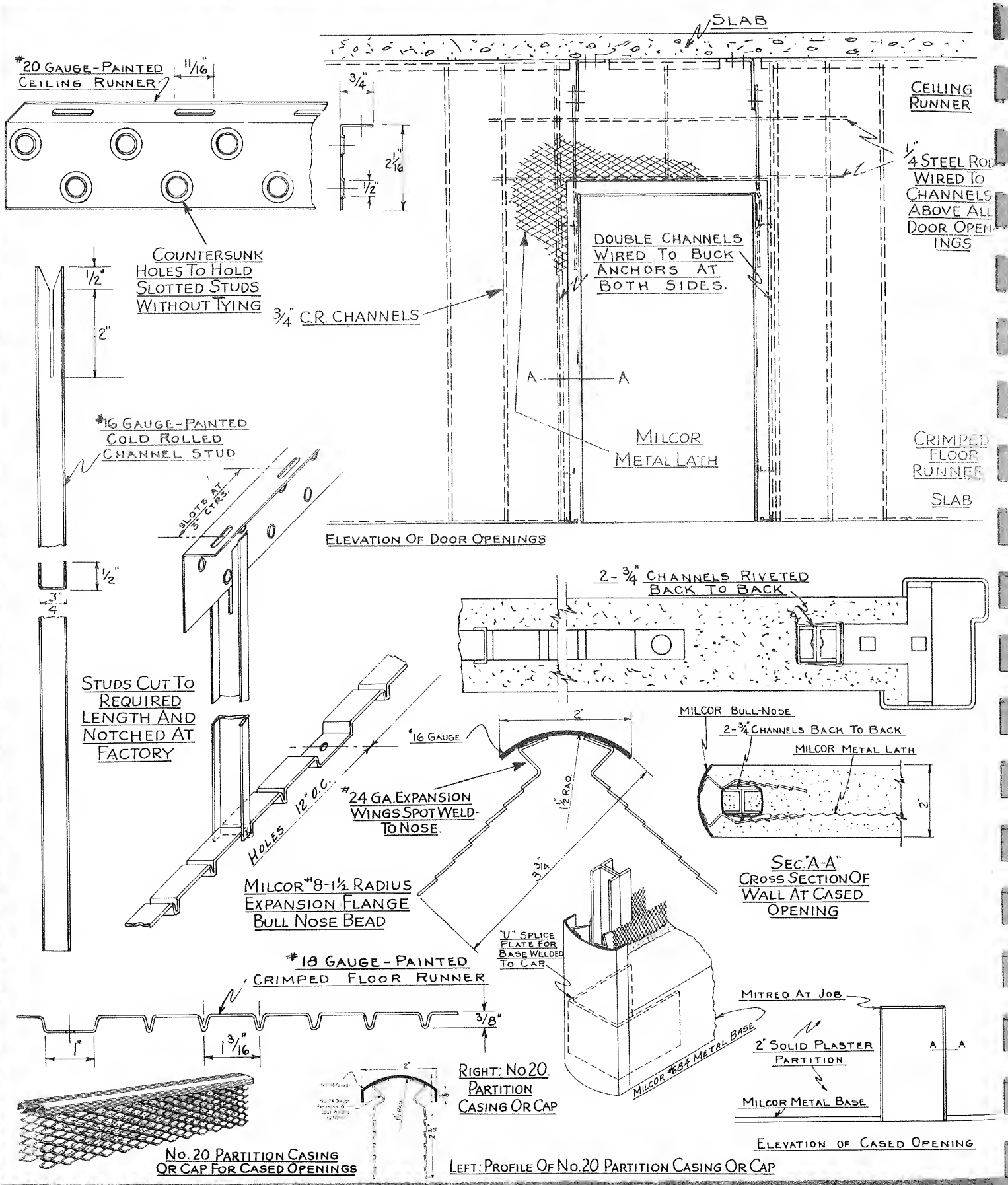


*694 FLUSH METAL BASE ACTING AS BASE, PLASTER SCREED AND SUPPORT FOR STUDS.

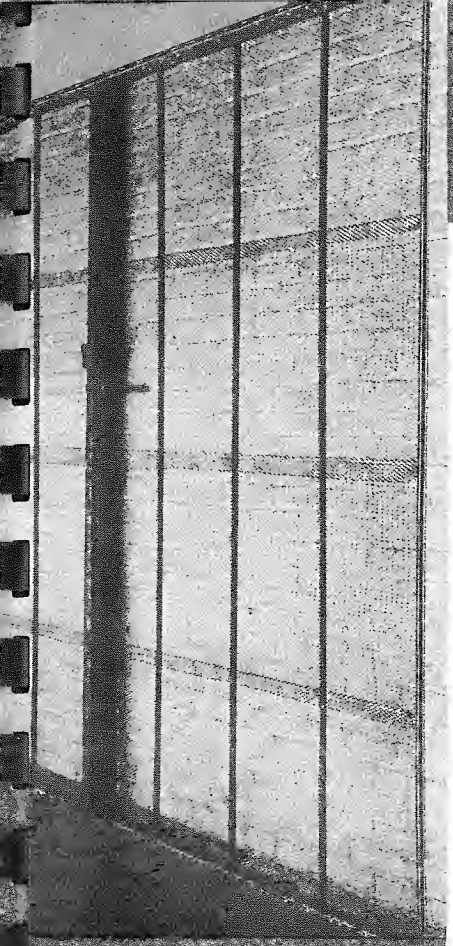
MILCOR No. 8 EXPANSION BULL NOSE CORNER BEAD USED WITH CASED OPENINGS

No. 20 PARTITION CASING OR CAP FOR CASED OPENINGS

MILCOR SOLID PARTITIONS



MILCOR FURRING SYSTEM WITH REGULAR FLOOR RUNNER OR SPECIAL BASES



Floor, Ceiling and Floor Runner, Channels and Lath assembled for use as furring for plastered Wall.

Section showing furring anchors recommended for use where walls are over 3 feet in height.

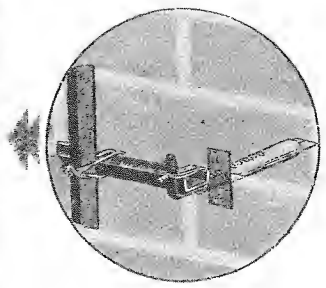
The Milcor system, combining Ceiling Runner, Floor Runner, Channels, and Metal Lath, provides an exceptionally practical plaster base for furred walls. This construction permits the use (at certain ceiling heights) of an absolutely free standing inner wall, with no contact to the outside masonry wall. The space between the plastered wall and the masonry wall is entirely clear and open and it may be used as a dead air space or it may be filled with insulating material. It is frequently used to conceal ducts, pipes, and conduits.

BRACING FOR HIGH CEILINGS

When the ceiling height exceeds 8 feet, bracing at 4-foot intervals is recommended. The K-M Adjustable Furring Wall Anchor has been found completely satisfactory for this purpose. It is specially designed for bracing and strengthening free standing furring systems. Note illustration below showing detail of the K-M Anchor. The Furring Anchor Sockets are inserted in the masonry at the time of construction, in horizontal rows not to exceed 4 feet. The vertical spacing of the rows also should not exceed 4 feet. Sockets should be provided every 8 inches on all corners, openings, and breaks in the furring.

Furring Anchor Brackets are inserted into the sockets flat-ways until the angle-head touches the stretched channel line and then locked in place by giving the bracket a quarter right turn, which places the angle-head in an upright position. Horizontal bracing channels are then tied to the brackets in the usual manner for supporting the vertical channel.

SPECIAL METAL BASES FOR USE WITH MILCOR FURRING SYSTEM



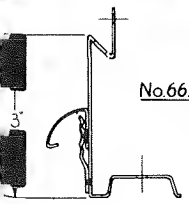
K-M Furring Clip

The metal bases illustrated in profile views across the lower section of this page will be found thoroughly practical for use with free standing or braced furring walls. Generally the units serve as a combination floor runner, plaster screed and metal base. They conform in design to Nos. 664, 667, 684, and 694 Metal Bases for Milcor Solid Partitions. All units are furnished in 2, 2½, 3, and 4 inch heights. Splice plates are available as required. Use of these metal bases effects a saving in erection cost and assures a neatly finished job.

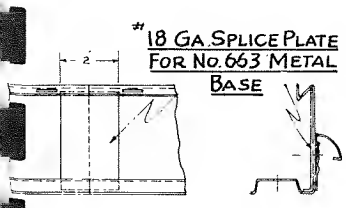
METHOD OF ERECTION

The method of erection of the steel reinforcing for the MILCOR Furring System is the same as that used in the Solid Partitions. Floor and Ceiling Runners are placed at the desired distance from the outside wall; channels inserted, and lath attached as in the ordinary process. Plastering is done on one side only.

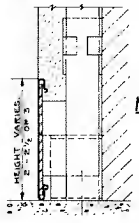
MILCOR METAL BASES FOR FURRED WALLS



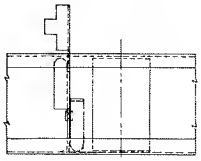
No. 663 For Furred Walls



* 18 Ga. Splice Plate For No. 663 Metal Base

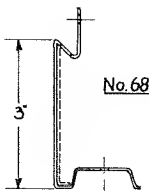


No. 667 For Furred Walls 16, 18 or 20 Gauge

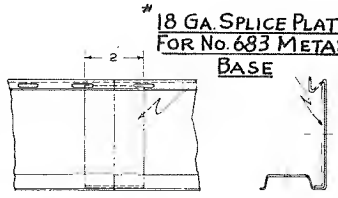


ELEVATION AT JOINT FROM INSIDE SHOWING SPLICE PLATE AND FURRING CLIP

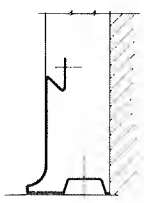
ISOMETRIC VIEW DOUBLE CLIP — HOLD DOWN MEMBER REMOVED TO SHOW CONSTRUCTION



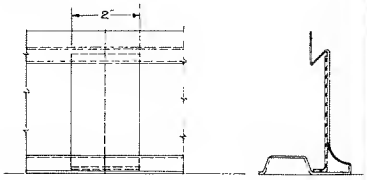
No. 683 For Furred Walls



* 18 Ga. Splice Plate For No. 683 Metal Base



No. 693 For Furred Walls



ELEVATION. SECTION SHOWING 'L' TYPE SPLICE PLATE IN POSITION AT BUTT JOINT 693 BASE.

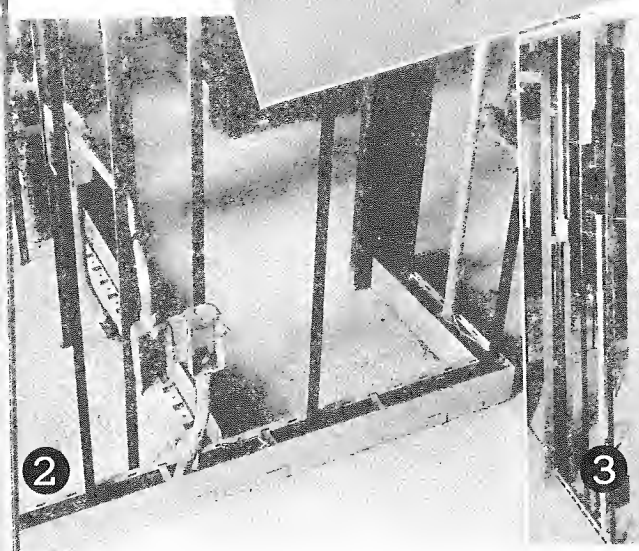
EFFICIENCY—ECONOMY

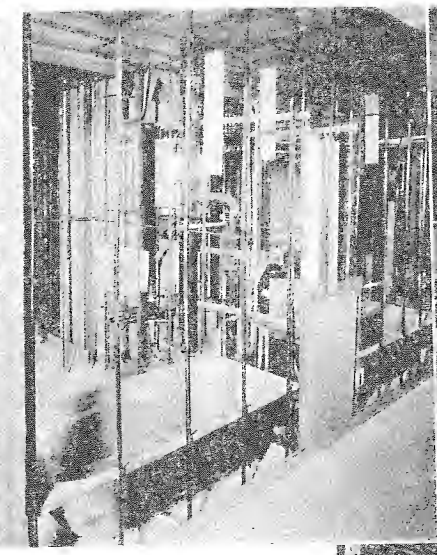
OF MILCOR SOLID

AS DEMONSTRATED IN

SOME OF THE HOU
MILCOR SOLID P

Brentwood Project .....Jacksonville, F
Booker T. Washington Project..Columbus, Ga.
Booker T. Washington Addition.....
..... Columbus, O
College Creek Project.....Annapolis, M
Lincoln Homes.....Trenton, N
Mayor Donnelly Homes.....Trenton, N
Willert Park.....Buffalo, N.
South Jamaica Project...South Jamaica, N.
Adrean Terrace.....Utica, N.





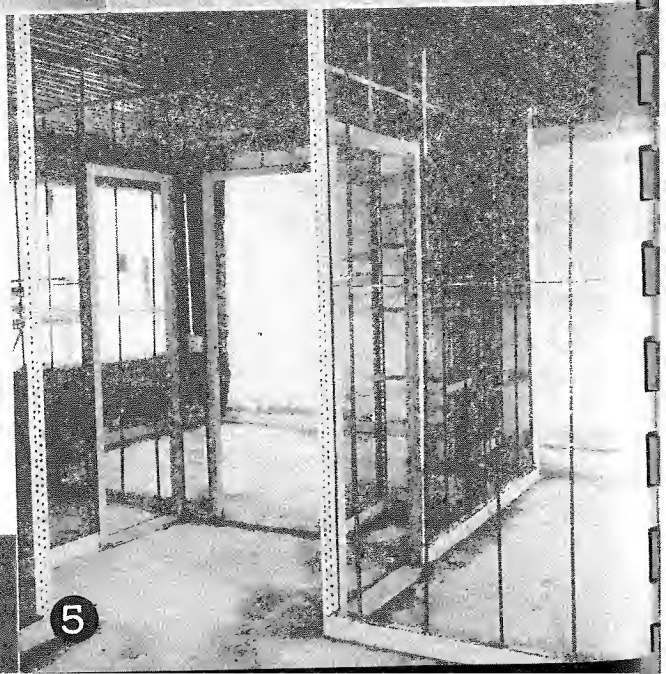
1 Milcor Metal Base being installed in Brentwood Park Housing Project, Jacksonville, Florida.

2 Photographs 2, 3, and 4 were taken in the Abbotsford Apartments, Milwaukee, Wisconsin. Note how easily electrical outlets are installed.

3 Roughing in of the plumbing is extremely simple when the Milcor Solid Partition System is used.

4 Metal lath is being applied to the channel studs preparatory to plastering. Observe the absence of debris even in the midst of construction.

5 This is another view of the Brentwood Project shown in photograph No. 1. Solid Wing Corner Beads have been installed.



FIREPROOF—SANITARY

ND PRACTICABILITY

RTITIONS and METAL BASES

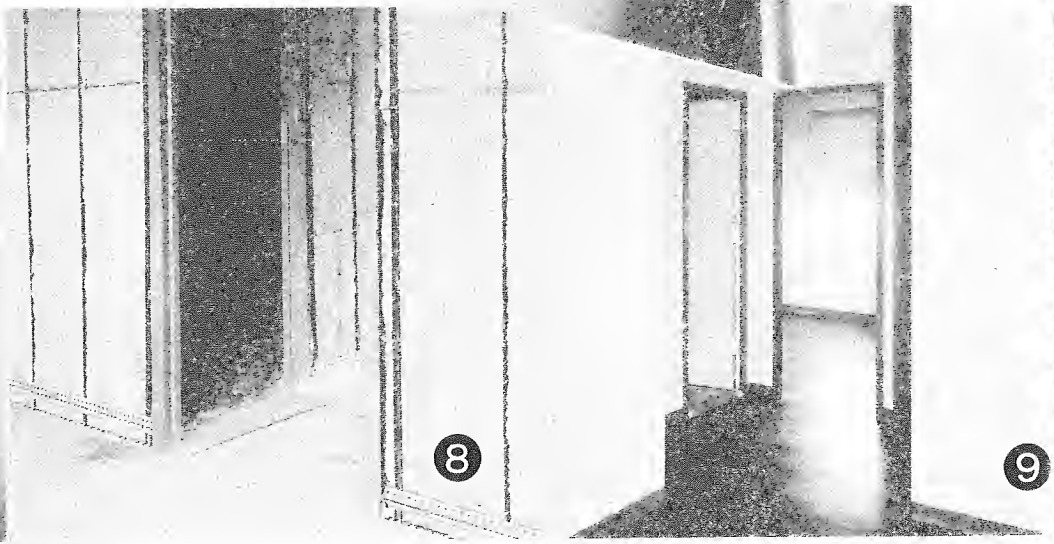
S. HOUSING PROJECTS

IG PROJECTS USING TITION SYSTEMS

ulford Street Project.....Yonkers, N. Y.
estlake Project.....Youngstown, Ohio
enwood Project.....Philadelphia, Pa.
sker Project.....Philadelphia, Pa.
eorge Foster Peabody Project.Columbus, Ga.
ncoln Apartments.....Frederick, Md.
eo. Hoverter Housing Project.Harrisburg, Pa.
apitol Homes.....Atlanta, Ga.

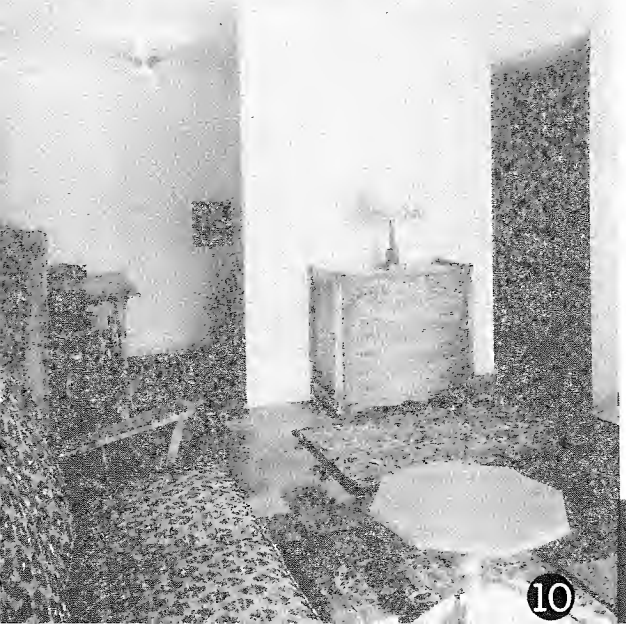
6

7



8

9



10

6 Milcor Expansion Bull Nose Corner Bead has been used in place of metal casing in this apartment building.

7 Expansion Wing Corner Bead used with the Milcor Solid Partition System in Fairview Manor Apartments, Ithaca, N. Y.

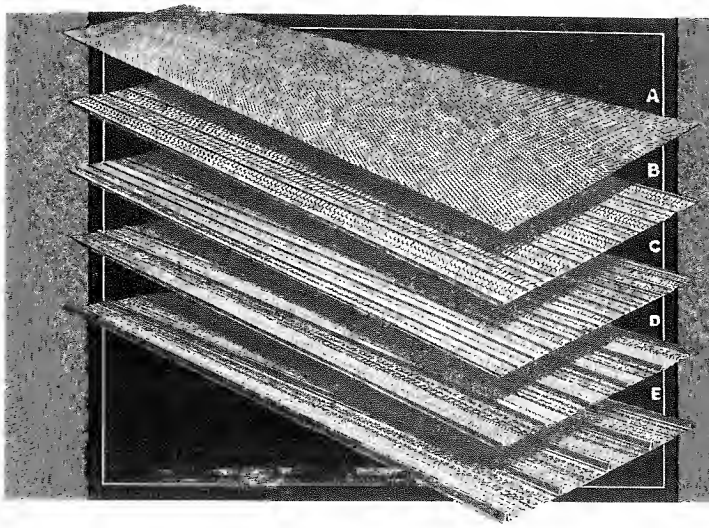
8 Valley View Housing Project, Cleveland, Ohio. Photograph shows partition when plastered only on one side.

9 View of completed interior, Brentwood Housing Project, Jacksonville, Florida (shown in pictures Nos. 1 and 5).

10 View of completed interior, Abbotsford Apartments, Milwaukee, Wisconsin (shown in pictures Nos. 2, 3, and 4).

STRONG—PERMANENT

MILCOR METAL LATH



The Milcor Steel Company is the foremost national manufacturer of "Firesafe" sheet metal products, largely consumed by the building industry. Constant improvement in design, materials, workmanship, and methods of production has marked the Company's progress, until today Milcor Products are accepted nationally as standards of quality.

KEY TO LETTERS AT LEFT

A—Milcor Netmesh or Smoothmesh Metal Lath

B—Kuehn's Specialmesh Metal Lath

C—Milcor Stay-Rib Metal Lath No. 1

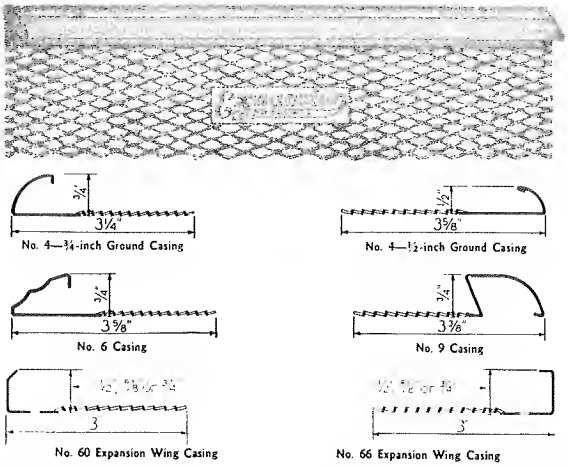
D—Milcor ⅜-in. Stay-Rib Lath No. 2

E—Milcor ½-in. Stay-Rib Lath No. 3

TYPES OF METAL LATH AND RECOMMENDED SPACING OF STUDS

The weight and type of lath to be used will depend on the spacing of studding desired. With 12-inch spacing a 2.50-lb. netmesh lath is satisfactory, though some specifications may require 3 lbs. or even 3.40. By increasing the spacing to 16 inches and using 3.40-lb. lath a further saving can be effected.

"EXPANSION" DOOR AND WINDOW CASINGS



Designs: Made in six designs—No. 4 ¾" Grounds, No. 4 ½" Grounds, No. 6, No. 9, and Styles Nos. 60 and 66, as shown in cross-sections above.

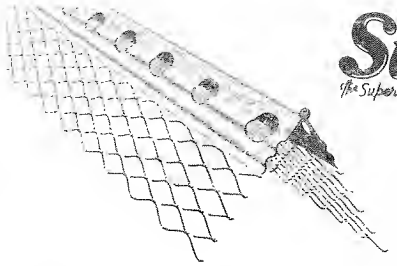
Materials: Sheet Steel Galvanized — Nos. 4, 6, and 9 cut from 24-gauge sheets. Nos. 60 and 66 cut from 20- and 24-gauge sheets. Exposed faces painted with gray primer.

Armco Ingot Iron—cut from 24-gauge sheets.

"MILCOR" METAL BASE SCREEDS

Curved Point Base Screed — Plain Base Screed

Furnished in 10 ft. lengths, packed approximately 1,000 ft. to crate.



PATENT APPLIED FOR

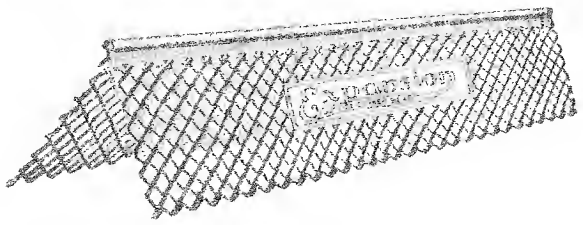
Super-Ex

The Superior Expansion CORNER BEAD

THE SENSATIONAL NEW MILCOR CORNER BEAD

Combines all the advantages of both Expansion and Solid Wing Corner Beads. Absolutely rigid — excellent plaster bond. Made of Galvanized Sheets, 26 and 24 gauge. Crated in approximately 500 foot lots. Weight per 1,000 feet crated, 340 pounds—26 gauge and 440 pounds—24 gauge.

"EXPANSION" CORNER BEAD No. 1



Milcor Expansion Corner Bead may be used on outside corners of Solid Partitions. We also furnish this Expansion Corner Bead with one narrow wing for use on arches and similar openings. Made from No. 26 and No. 24 Gauge Galvanized Steel or Armco Ingot Iron. Lengths of 6, 7, 8, 9, 10, 11, and 12 feet.

Write for the Milcor Manual No. 20-G showing the Complete Line of Fireproof Building Products.

MILCOR STEEL COMPANY

MILWAUKEE, WISCONSIN — CANTON, OHIO

CHICAGO, ILL.; KANSAS CITY, MO.; LA CROSSE, WIS.; ATLANTA, GA.; NEW YORK, N. Y.; ROCHESTER, N. Y.; BALTIMORE, MD.

PARTITION HANDBOOK

SPACE SAVING
IS COST SAVING

MILCOR STEEL COMPANY
MILWAUKEE, WISCONSIN — CANTON, OHIO
Chicago, Ill. — Kansas City, Mo. — La Crosse, Wis.
Rochester, N. Y. — New York, N. Y. — Baltimore, Md. — Atlanta, Ga.

METAL LATH MANUFACTURERS ASSOCIATION
CHICAGO

The PARTITION HANDBOOK

by

ERWIN M. LURIE, C. E.

Engineer of Building Construction
Member Western Society of Engineers
Member Acoustical Society of America

The American Institute of Architects
Standard Construction Classification:

A. I. A. File Number

20-B-11

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10, 14-B-2, 19-J
20-C, 21, 33-N-9

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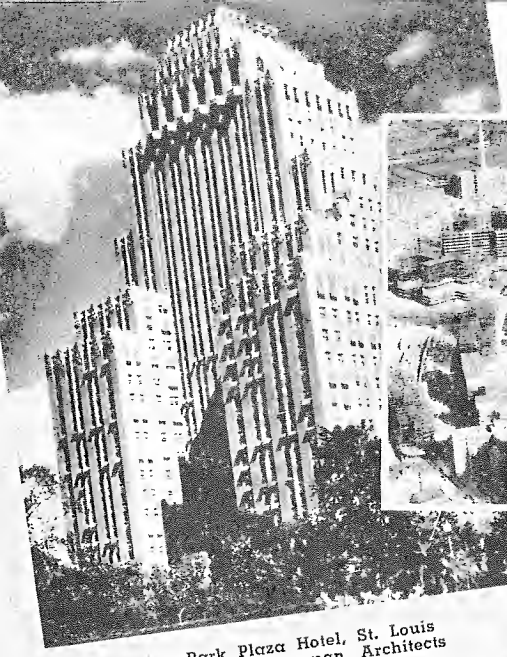
208 SOUTH LA SALLE STREET CHICAGO, ILLINOIS

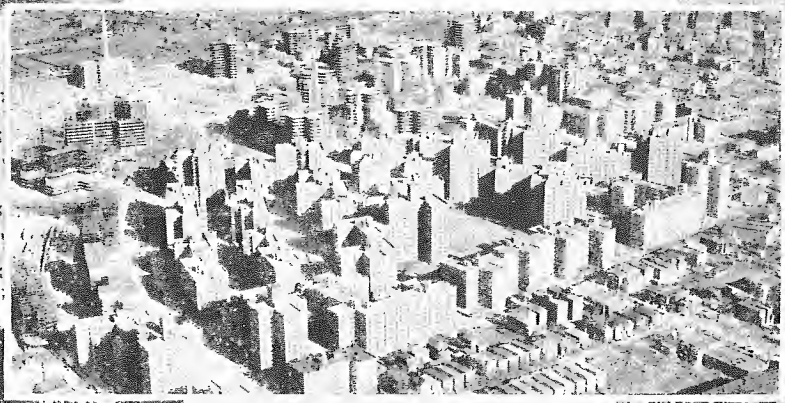
Printed in U.S.A.

METAL LATH PARTITIONS

In All Types of Structures From Coast to Coast



Park Plaza Hotel, St. Louis
Schopp & Bauman, Architects

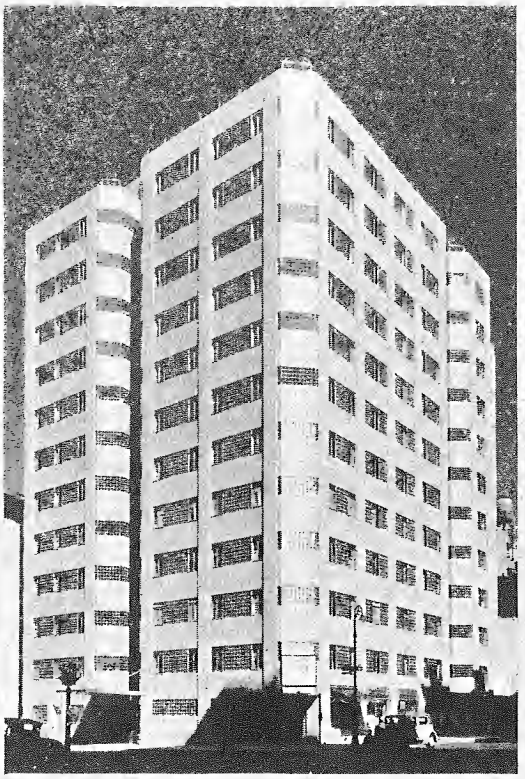


Parkchester, Bronx, New York
Richmond H. Shreve and Irwin Clapp,
Architects for the Board of Design

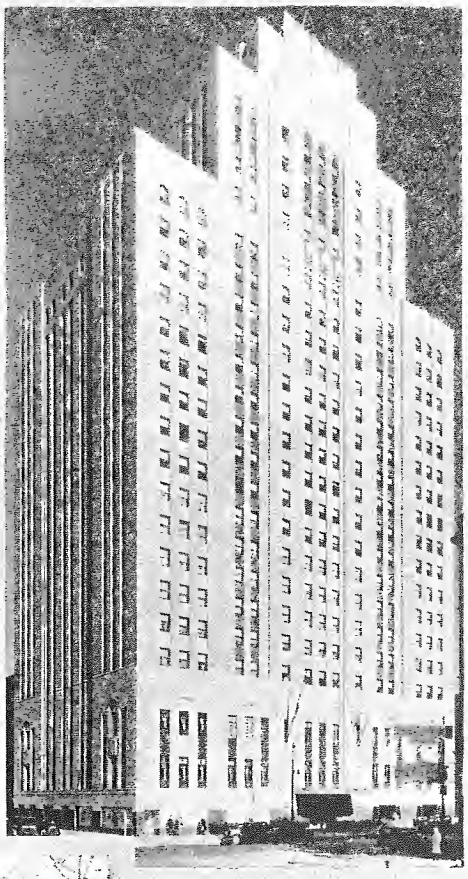
Milam Building, San Antonio
Geo. Willis, Architect

PLATE I

Republic and American Exchange
Buildings, Dallas
Coburn, Smith & Evans, Architects



25 East 83rd Street Apartment,
New York City
Frederick Ackerman, Architect



Victor Lawson Y. M. C. A.,
Chicago
Perkins, Chatten & Hammond,
Architects

Lutheran Hospital, Moline, Ill.
O. Z. Cervin, Benj. A. Horn,
R. C. Sandberg, Architects

Dist. 5 School, Dakota County, Minn.
J. C. Niemeyer, Architect

Neil House, Columbus, O.
Gustave Drach, Architect

Foreword

IN THE TEN YEARS spanned by the original edition of the PARTITION HANDBOOK much has occurred to justify its publication. To many industries—and to many building material products—these have been truly "lean" years. In the face of this, Metal Lath, and its efficient complement, Metal Studs, have won an increasingly popular position at the hands of Architects, Builders and Owners.

¶ In thorough appreciation of this steadily growing preference for Metal Lath and Plaster Partitions this second edition of the PARTITION HANDBOOK is offered.

¶ Again, we attempt here a rational and factful discussion of the various types of Partitions, and their relationship to cost and space saving, fire protection, sanitation, crack resistance, and transmission of sound; in both fireproof and non-fireproof buildings—from the smallest home to the tallest skyscraper, and the multiplicity of institutional and industrial structures in between.

¶ Additional scientific and practical data are now available to confirm our original premises, and to further justify your selection or recommendation of Metal Lath Partitions for the triple reasons of SPEED, SAVINGS and SAFETY.

¶ This second edition of the PARTITION HANDBOOK covers a broader range of study and application. The methods suggested are now established time-tested practices. They have been obtained through continuing field investigations, and manufacturers' research, and through the liberal cooperation of Architects, Engineers, Contractors and Craftsmen.

¶ A glance at the INDEX on Page 5 and that on Page 59 will indicate the enlarged scope of this new Handbook, and the tremendous potentials of Metal Lath Partitions. And a check of the list of typical users beginning on Page 56 will prove their almost universal acceptance.

¶ *Further information is available freely upon request to our Engineering Department, which will also welcome any suggestions relative to the contents of this Handbook. This is one of a series of informative literature covering Metal Lath and its uses.*

Metal Lath Manufacturers Association

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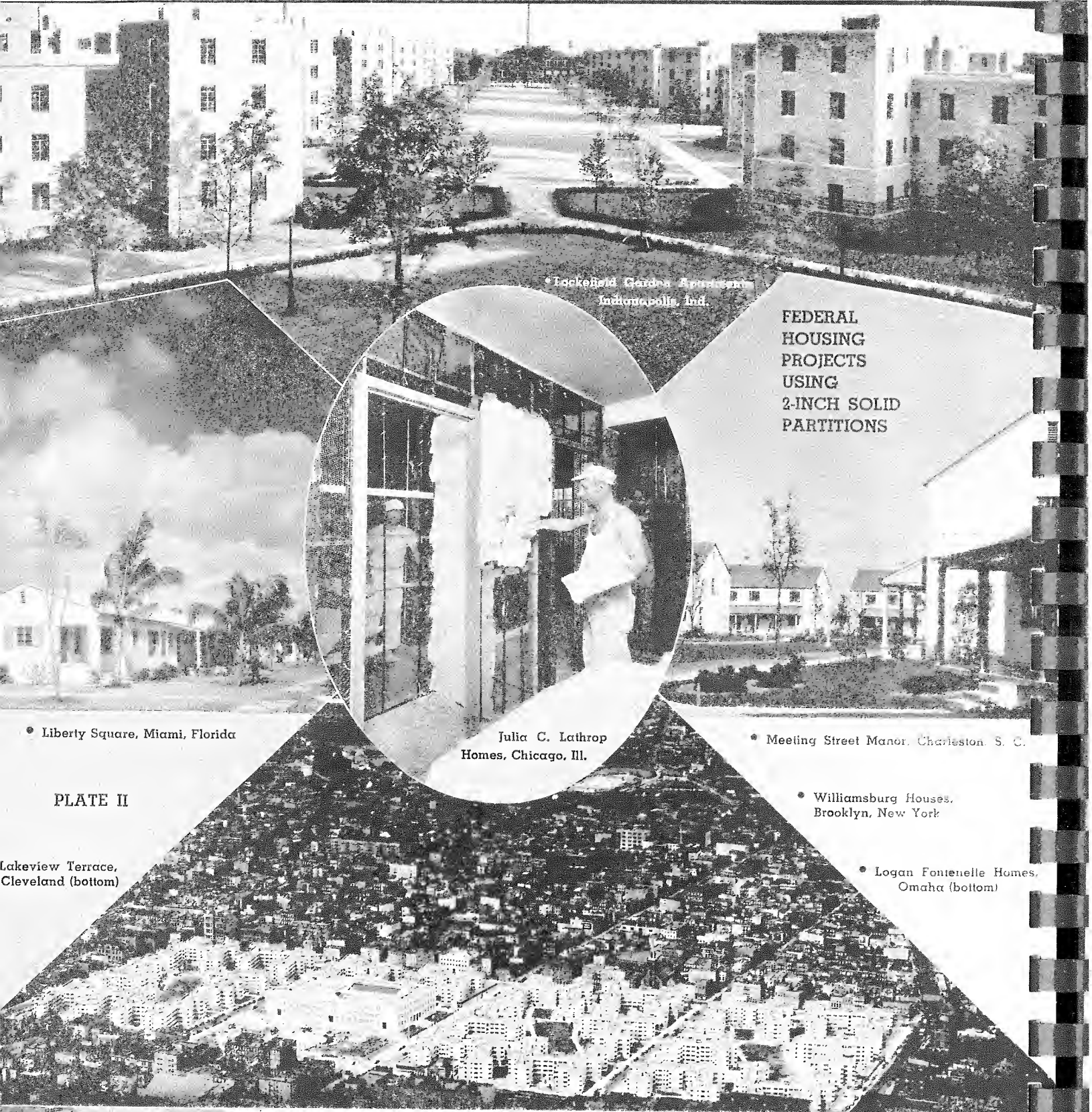


Tockefield Gardens Apartments, Indianapolis, Ind.

FEDERAL HOUSING PROJECTS USING 2-INCH SOLID PARTITIONS

• Liberty Square, Miami, Florida

Julia C. Lathrop Homes, Chicago, Ill.

• Meeting Street Manor, Charleston, S. C.

PLATE II

• Williamsburg Houses, Brooklyn, New York

Lakeview Terrace, Cleveland (bottom)

• Logan Fontenelle Homes, Omaha (bottom)

INDEX

In Two Parts

PART I — PROPERTIES OF PARTITIONS

(FOR PART II — DETAILS OF CONSTRUCTION — SEE PAGE 59)

CHAPTER I

A Brief Description of Metal Lath and Other Partitions

1. Metal Lath Partitions

A. Metal Lath, Studs, and Lathing

Metal Lath is made from steel sheets slit or punched and then expanded or otherwise formed into a network or mesh of steel, containing numerous openings to facilitate the spreading of plaster and its keying to the steel. Each sheet of Metal Lath is covered with a special preservative paint or is cut from galvanized sheets. After the lath is in position in the building the plaster applied over it affords permanent protection to the steel.

Metal Studs are usually ¾-inch or 1-inch cold or hot-rolled channels; or, in the case of Hollow Partitions, may be prefabricated of special design. Studs are spaced from twelve to thirty-two inches on center depending upon the type or weight of lath used. The lath is secured to them at approximately 6-inch intervals by means of wire ties.

There are three general types of Metal Lath Partition construction: Solid, Hollow, and Double.

B. Solid Metal Lath and Plaster Partitions

These are two-way steel reinforced, dense, monolithic slabs of plaster usually 2 to 2½ inches thick. Steel channel studs, running from floor to ceiling, stoutly anchor the partition to floor and ceiling and reinforce it vertically. The entire slab is fully reinforced horizontally and diagonally by a complete coverage of continuous overlapping sheets of Metal Lath which are securely attached to the studs and to each other. *A single lathing surface, applied to one side of the studs only*, being nearly centrally located, thus *serves both faces* of the partition as plaster base and reinforcement. *(See Figure 1.)*

In its construction, the lath side of the partition is first given a heavy trowel coat of plaster (gypsum, portland cement, lime or Keene's cement) which is pushed well through the mesh. Having set over night, the keys of the first coat are backed up by and embedded solidly in the second coat of plaster which is applied on the reverse or channel side of the partition to completely cover the lath and the channel studs. Three or four successive coats of plaster are now applied alternately on one side of the partition and then the other until channels and lath are buried deeply within a solid, monolithic slab of the required thickness. Consequently, as fully reinforced plaster, the construction acts as a unit to resist physical impact, wind, fire, water, sound and vibration.

C. Metal Lath and Plaster Hollow Partitions

In Metal Lath and Metal Stud Hollow Partitions the lath is applied on both sides of wide single studs, prefabricated in widths from 2 to 6 inches; or on the outer face of double rows of channel studs each pair of which is held together by suitably designed spacers. The depth is determined by height of the partition or by the space required for pipes, ducts, etc., to be concealed. Overall thickness is 3½ to 7½ inches. *(See Figure 2, and* PLATE III, *Page 92.)*

For the common type of wood stud hollow partitions, the Metal Lath is applied continuously, using nails or other attachments, to both sides of ordinary 2 by 4's or 2 by 6's. Each face is covered with approximately ¾-inch of plaster. *(See Figure 4.)*

D. Metal Lath and Plaster Double and Staggered Stud (Sound Insulating) Partitions

Double Partitions are similar to the double studded hollow partitions with the exception that spacers are eliminated, additional reinforcing being provided when necessary in the hollow space, but each side of the partition is structurally independent of the other. Overall thickness is 4½ inches and upward. *(See Figure 3.)*

Staggered Stud Hollow Partitions are usually constructed with two rows of wood or metal studs, of the types used in hollow partitions *(C, above)*; the studs on either face being staggered in position relative to those on the other face. No ties, spacers or other devices are used to connect the two rows of studs which are thus entirely independent of one another. Overall thickness of partition is 4½ inches, and upwards.

2. Masonry, Wood Stud, and Other Partitions

In the discussion of partitions throughout this Handbook, various types of masonry and wood stud partitions will be mentioned occasionally; but it is not the purpose to consider them in detail except for certain properties which will be discussed in the respective chapters dealing with them. Included will be masonry partitions made of hollow and solid units of concrete, clay, gypsum and glass, for wall thicknesses ranging from 3 to 8 inches; wood partitions with facings of plastering on Metal Lath and other bases; and those finished with unplastered surfacings of various types; and prefabricated panel construction made of various materials.

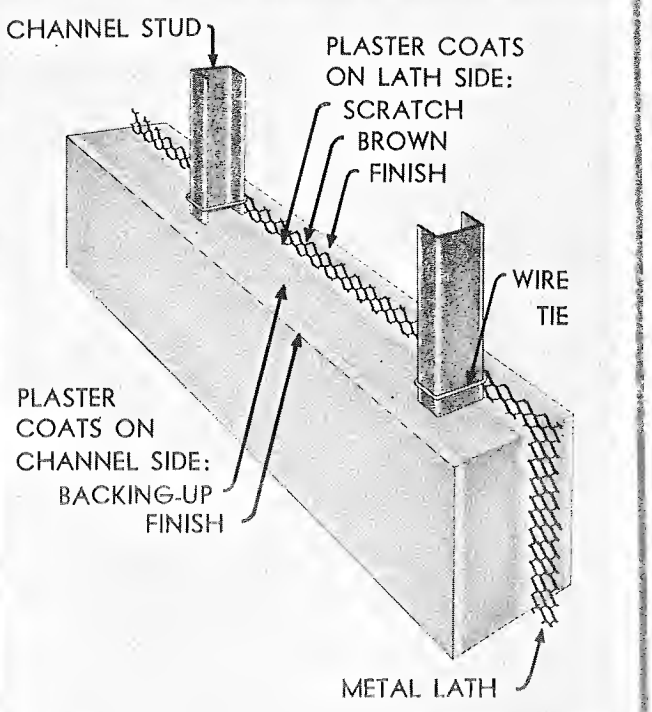


Fig. 1. Solid Metal Lath and Plaster Channel Stud Partition, Showing Component Parts and Plaster Coats. Usually 2 Inches Thick, But May Be Constructed of Thicknesses Up to 3½ Inches.

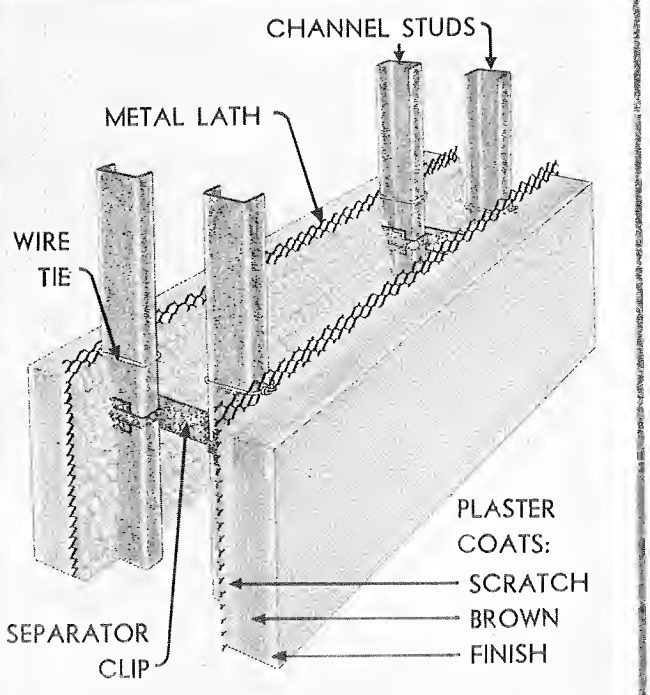


Fig. 2. Metal Lath and Plaster Channel Stud Hollow Partition, Showing Stud Assembly of Double Channels With Clips. Prefabricated Steel Studs (See PLATE III, Page 92) Are Widely Used for This Purpose.

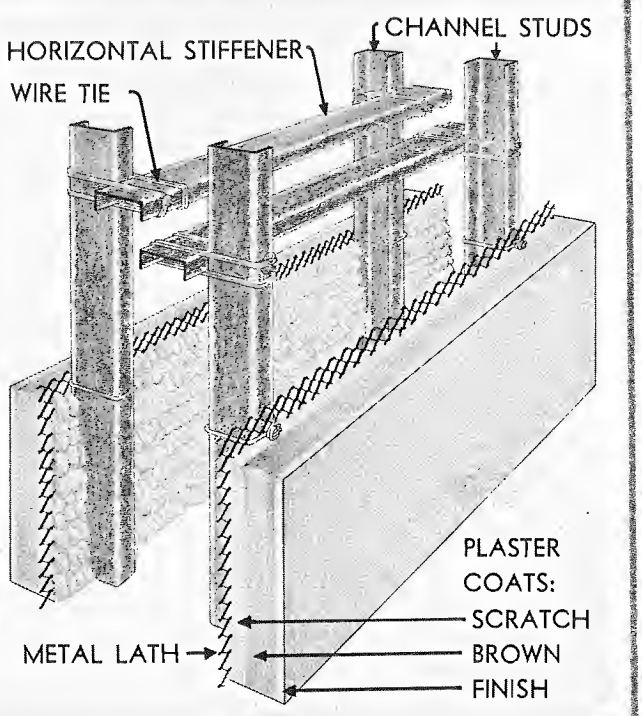


Fig. 3. Metal Lath and Plaster Channel Stud Double Partition, Showing Complete Separation of Two Faces of Partition. Prefabricated Steel Studs, Staggered, May Also Be Used.

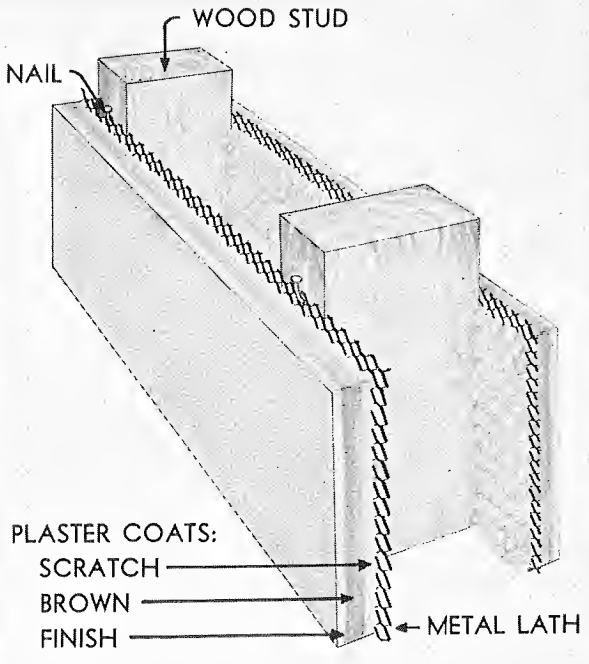


Fig. 4. Metal Lath and Plaster Wood Stud Hollow Partition, Showing Lath Nailed Direct to Studs. Studs Are Usually 2x4-Inch or 2x6-Inch Nominal Size.

CHAPTER II

Eight Influencing Factors in Selection of Partitions

1. Cost
2. Space Economy
3. Fire Resistance
4. Sound Insulation
5. Crack Resistance
6. Sanitation
7. Weight
8. Adaptability

The above factors are properties or characteristics of partitions. Their relative importance varies with:

A. Type of Construction
(fireproof, semi-fireproof, ordinary, etc.)

B. Occupancy
(housing, hotels, office buildings, schools, hospitals, etc.)

C. Nature of Investment
(commercial: long-time and speculative; institutional: post offices, libraries, city halls, etc.)

A survey of the entire building field and consideration of the factors most often stressed by architects, builders and owners show that the average relative order of importance for various types of occupancy throughout the country is as given in TABLE I.

TABLE I—Order of Importance of Properties of Partitions in Various Occupancies

FACTORS	Housing, Apartments, Residential	Dormitories, Hotels, etc.	Office Buildings	Mercantile Buildings	Schools	Hospitals	Total Points	Weighted Order of Importance
Space Economy	2	1	1	2	5	3	14	1
Cost	1	2	2	1	3	6	15	2
Fire Resistance	4	5	5	4	1	1	20	3
Sound Insulation	3	3	4	8	6	4	28	4
Crack Resistance	5	6	7	3	4	5	30	5
Sanitation	6	7	8	7	2	2	32	6
Weight	8	4	3	5	8	7	35	7
Adaptability	7	8	6	6	7	8	42	8

In this tabulation, office buildings and hotels are of the modern types of fireproof or semi-fireproof construction. Mercantile buildings and hospitals are both slow burning and fireproof. Schools, apartments, public housing, and residential buildings are of ordinary construction, semi-fireproof and fireproof.

This table indicates the wide variance in the relative values assigned to the eight influencing factors in the different types of occupancy. Closer study, however, reveals that *space economy* and *cost* are the two most vital factors in the selection of types of partitions for a majority of all occupancies. Particularly for buildings of the income-producing type, the construction cost for each unit of rentable area must be reduced to the minimum and the efficiency attained in this respect will ofttimes determine the degree of success of the project.

In schools and hospitals, fire protection is naturally the deciding factor. This also applies to certain parts of all buildings, such as stairway and elevator enclosures. Sound insulating properties, although of great concern in hotels, large-scale multiple housing and apartments, are secondary to cost and space economy. Crack resistance and sanitary properties are important in reducing maintenance and safeguarding health.

In low buildings, as schools and residences, the *dead weight load* of partitions is not primary. However the dead weight factor becomes a first consideration in the economical design of tall office buildings and hotel structures.

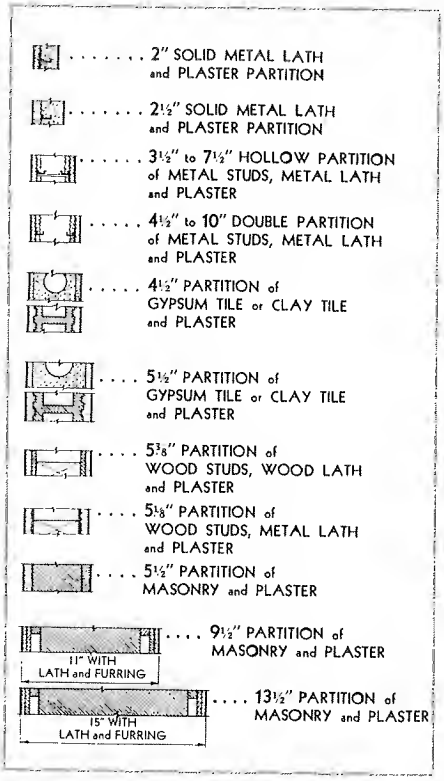


Fig. 5. Thickness Comparisons of Commonly Used Partitions.

CHAPTER III

Space Cost, Its Relation to Financial Set-Up of Building Projects

Digest and Recommendations:

Overall efficiency of the building is a primary object of modern design. Whatever its occupancy, an income-producing building must give first consideration to space economy. The discussion of space economy of buildings, not only of the income-producing type, but also of others, which is fully covered in this chapter, may be summarized in the following:

Thin "streamlined" partitions are replacing thick obsolete partitions.

Two-inch Metal Lath and Plaster Partitions permit maximum design efficiency.

Principles of space economy apply to all buildings, regardless of size.

Space-saving of 2-Inch Metal Lath Partitions may be utilized: (a) to increase the net or usable area between wall boundaries; or (b) to reduce the gross volume or cubage of building, and yet produce the same usable area obtainable with thicker partitions.

Methods for determining dollar value of space saved. Analysis of space-saving in apartment building.

Building Code recognition of Metal Lath Partitions reduces construction costs and encourages building.

2-Inch Metal Lath Partitions add $30,000 to hotel's annual income; save $35,000 in construction costs.

Majority of large scale housing projects use 2-Inch Metal Lath Partitions.

2-Inch Metal Lath Partitions save $49,000 in land and construction cost volume for office building.

Comparisons with Other Types of Partitions.

1. Value of Space Saving in Design Efficiency

"Thick walls and floor should be charged with a large part of the loss incurred in the operation of old buildings and in their early obsolescence." This is the gist of the studied conclusions in "Office Building Obsolescence" by George D. Bailey, former Research Engineer for the National Association of Building Owners and Managers.

In his analysis of the design, construction and equipment of a semi-monumental office building erected in Chicago in 1892 and later replaced by a modern steel structure, Mr. Bailey's report continues:

. . . summarizing, the total $53,383 represents approximately what might have been received in addition to the actual gross income, had the construction design been modern rather than the design of 35 years ago, plus the 10% charge customarily made in such estimates, against the investment represented by the extra amount of construction . . ."

Two-Inch Solid Metal Lath Partitions Produce Maximum Design Efficiency Measured by Construction Required To Produce Unit of Rentable Area

Again quoting the Bailey report: "The obsolescence of the layout design is evident in the amount of construction required to produce one square foot of rentable area. For (this building) the figure was 24, whereas for modern buildings it varies between 18 and 20, with instances as low as 16. Assuming 19 to be a modern average, (this) building layout was 26% less efficient."

Since *Design Efficiency* is the amount of construction required to produce one square foot of rentable area, and since the space-volume of both walls and floors in the average building are now reduced to practical minimums, a further increase in efficiency is obtainable only by reducing the thickness of partitions. *Therefore other things being equal, maximum design efficiency is obtained by the use of 2-Inch Solid Metal Lath and Plaster Partitions.*

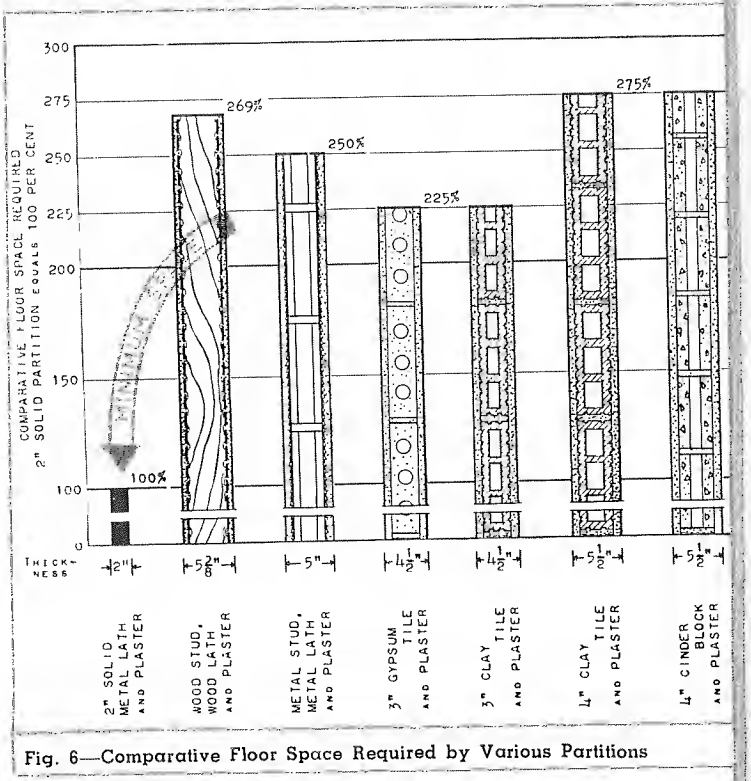


Fig. 6—Comparative Floor Space Required by Various Partitions

Space Saving Attracts Renters

Thinking renters realize that if construction costs as affected by labor and materials remain at present levels, lower rents are not in immediate prospect. Therefore a lessor's one best opportunity to buy space at lower cost is to select structures which yield the maximum footage of *usable* space per dollar. Those who have been paying for space upon the customary square foot basis, with measurements from center to center of thick masonry partitions, are now realizing that with thick partitions they *pay for a large portion of space which is in effect a Part of the Building.*

Streamlined 2-Inch Partitions Replacing Obsolete Thick Partitions

Two-inch Solid Metal and Plaster Partitions are economical in first cost, lightweight, serviceable, lasting, fireproof, occupy a minimum of valuable floor space and deliver the fullest measure of space-economy. Architects and engineers recognize that these many efficient assets retard early obsolescence.

2. Greatest Space Saving from 2-Inch Solid Metal Lath Partitions

The exceptionally small amount of floor area occupied by Solid Metal Lath Partitions and the greater opportunities for space saving they afford in comparison with other previously popular types of partitions is graphically illustrated in *Figure 6* on the preceding page.

Structural Stability Also Favors Metal Lath Partitions.

This will be seen by reference to *Figure 7* below. This graph is adapted from the report of the Building Code Committee of the U. S. Dept. of Commerce entitled "RECOMMENDED MINIMUM REQUIREMENTS FOR MASONRY WALL CONSTRUCTION." Also shown are heights for Metal Lath Partitions as generally used and sanctioned by building codes.

More than ninety percent of all partitions used in modern buildings do not exceed 10 feet in height. The 2-Inch Solid Partition of Metal Lath and Plaster suitable for partitions of this height meets strength and stability requirements as satisfactorily as the 4 to 5-inch thickness required of masonry. For greater heights the space saving is even more marked. Solid Metal Lath Partitions, because of their two-way steel reinforcement, are permitted for heights for which considerably greater thickness would be required in non-reinforced masonry and other block partitions.

3. Two Basic Methods of Utilizing Space Saved by 2-Inch Solid Partitions

There are two practical methods by which the space-saving advantages of 2-Inch Metal Lath Partitions may be profitably applied:

A. If the size or gross ground area to be covered by the building is fixed, employ 2-inch partitions to increase the net usable or unencumbered floor space.

B. If the size of building or gross ground area is not fixed, its size and hence construction volume or cubage and costs can be diminished by employing 2-inch partitions in place of thicker partitions, and yet the same net usable floor area will be provided.

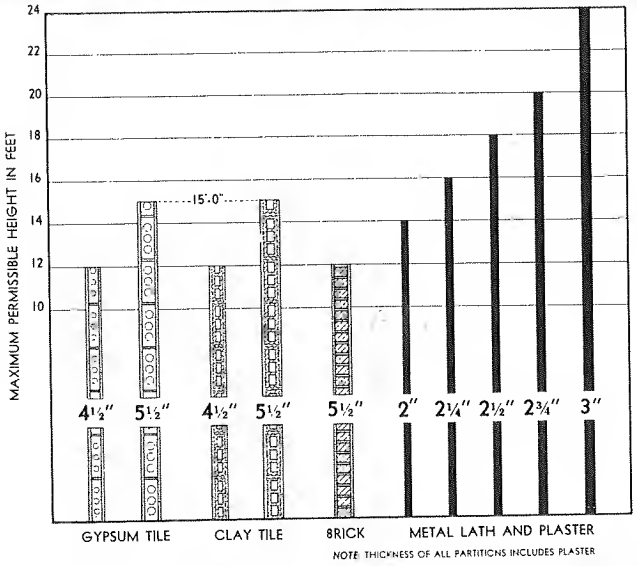


Fig. 7 Permissible Heights of Masonry and of Metal Lath Partitions In Relation To Thickness.

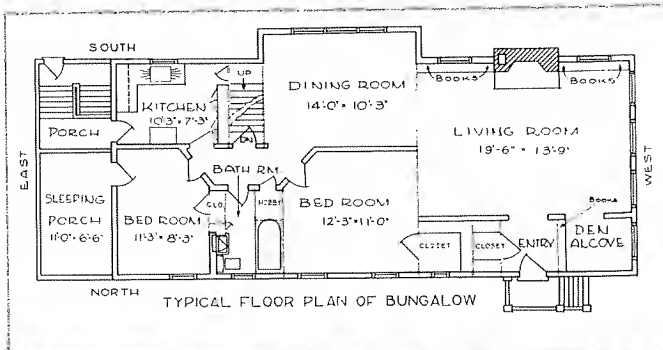


Fig. 8. Floor Plan of 5-Room Bungalow as Revised with Solid Metal Lath Partitions (red).

SPACE ECONOMY

1. Saving of several inches in thickness along every lineal foot of partition permits enlarging room areas and net usable space by as much as 7%.

2. By rearrangement of the floor layout, space-saving can be concentrated to produce more rooms or more "livability" and convenience.

3. In buildings of equal *gross area*, those containing 2-Inch Solid Partitions will provide increased space and therefore produce greater income than those in which the rentable space is subdivided by thick partitions.

4. Construction costs can be decreased, yet the same usable floor area secured, by reducing the cubical content through the use of thin partitions. See Tables II and III below.

NOTE: In both (3) and (4) the advantages of the thin or narrow partitions are vitally important to the investor because they add 5% to 12% to net income.

These basic principles of space economy apply to practically all buildings, regardless of size. Accordingly, we here treat structures in a succession of increasing sizes.

4. Space Saving For Bungalows

By redesigning a typical 1½-story, five-room bungalow layout to make use of shallow partitions, the layout of *Figure 8* was obtained. The original east and west partitions are retained as 2 x 4-inch bearing partitions to carry the ceiling joists above, while the north and south partitions, excepting for one wall of the bathroom in which soil pipes must be enclosed, have been changed from 2 x 4's to 2-Inch Solid Partitions, as shown by the single red lines.

Each of the new rooms is at least equivalent in area to the original; some are larger. Improvements in the layout as revised are: (A) Cupboards enlarged and shifted from the north to the west wall of the kitchen for easier access. (B) Larger closet space

Dollar Value of Space Saving Per Lineal Foot of Partition
(See Chapter IV for Construction Cost Savings)

TABLE II

Using 2-Inch Partitions Compared With	Thickness Saving of 2-Inch Solid Partitions	When Construction Cost PER SQ. FT. OF FLOOR AREA is —			
Partitions—		$4.00	$6.00	$8.00	$10.00
4 in. thick	2 in.	$0.67	$1.00	$1.34	$1.78
4½ in. thick	2½ in.	0.84	1.26	1.68	2.10
5 in. thick	3 in.	1.00	1.50	2.00	2.50
5½ in. thick	3½ in.	1.17	1.75	2.34	2.92

Values given are independent of partition height.

HOW TO USE TABLE II:

1. Q. What is TOTAL SPACE SAVING using 2-inch partitions instead of 4-inch partitions, where partition length is 1,000 feet and estimated floor area cost is $4.00 per sq. ft.?

   A. Look along line marked "4 in. thick" until it intersects with column under $4.00 to find Tabular or Space Saving value per lineal foot is $0.67. Then 1,000 × $0.67 = $670.00 TOTAL SPACE SAVING.

2. For other floor area costs, determine tabular values by direct proportion; i. e., for $4.50 per sq. ft. floor area costs, tabular value for 4 in. partition is $\frac{\$4.50}{\$4.00} \times \$0.67 = \$0.76$ PER LIN. FT.

3. Table also shows space-savings per square yard of partition, where height is 9 ft.; i. e.:

   Space-saving value of 2-inch partitions (9 ft. high) PER SQ. YD., compared with 4½ in. thick partitions when building construction costs are $6.00 per sq. yd., is $1.26.

4. For space-saving value PER SQ. YD. for heights other than 9 ft., multiply tabular values by 9/h, where "h" is the partition height; i. e.:

   Q. What is space-saving value per square yard of 2-inch partition, when height is 10 ft., the construction cost being $8.00 per sq. ft., the competing partition 5 in. thick?

   A. Tabular value for 9 ft. high partition for above condition is $2.00. Then space-saving value for 10 ft. high partition PER SQ. YD. is: $2.00 × 9/10 = $1.80.

TABLE III

Using 2-Inch Partitions Compared With	Thickness Saving of 2-Inch Solid Partitions	When Construction Cost PER CU. FT. BUILDING VOLUME is —			
Partitions—		$0.30	$0.40	$0.50	$0.60
4 in. thick	2 in.	$0.45	$0.60	$0.75	$0.90
4½ in. thick	2½ in.	0.57	0.76	0.95	1.13
5 in. thick	3 in.	0.68	0.90	1.13	1.35
5½ in. thick	3½ in.	0.79	1.05	1.32	1.58

Values given are for a partition height of 9 ft.

HOW TO USE TABLE III:

1. Q. What is TOTAL SPACE-SAVING using 2-inch partitions 9 ft. high instead of 4-inch partitions, where partition length is 1,000 ft. and cubic foot building cost is estimated at 40 cents?

   A. Look along line marked "4 in. thick" until it intersects with column under $0.40 to find Tabular or Space-Saving value per lineal foot is $0.60. Then 1,000 × $0.60 = $600.00, TOTAL SPACE-SAVING.

2. For other cubic volume costs, determine tabular values by direct proportion (partition height being 9 ft.); i. e., for $0.35 per cu. ft. construction volume costs tabular value for 4 in. thick partition is $\frac{\$0.35}{\$0.30} \times \$0.45 = \$0.53$ PER LIN. FT.

3. For savings PER LIN. FT. of partition of height other than 9 ft., multiply the tabular value by h/9, where "h" is the partition height; i. e.:

   Q. What is space-saving value PER LIN. FT. using 2-inch partitions, when height is 10 ft., the construction cost being $0.40 per cu. ft. and the competing partition 5 in. thick?

   A. Tabular value for 9 ft. high partition for above condition is $0.90. Then space-saving value for 10 ft. high partition PER LIN. FT. is: $0.90 × 10/9 = $1.00.

4. Table also shows, directly, space-saving values PER SQ. YD. of partition, for all partition heights; i. e.:
   Space-saving value of 2-inch partition PER SQ. YD., 12 ft. high, compared with 4½ in. thick partitions, when the construction costs are $0.40 per cu. ft., is $0.76.

for the east bedroom. (C) New linen closet and clothes chute in bathroom. (D) New closet for storage of sewing machine or outdoor sports equipment, therapeutic lamp or hobby.

These changes have cleared the entire south wall of the east bedroom, and have increased its usable floor space *over 17%*. In the small bedroom more clearance is provided, permitting much more effective arrangement of furniture.

Advantages Cost Little Extra

In most communities 2-Inch Solid Metal Lath and Plaster Partitions cost no more than 2 x 4-inch wood stud partitions with wood or gypsum lath and plaster each side; therefore the changes and added conveniences outlined for this typical bungalow represented practically no increase in the completed construction cost. Yet how much more "livable" it is!

Modernized Dwelling Designs

The use of thin partitions in small single family dwellings is of the same pattern as the present trend toward smaller homes, due alike to the tendency toward smaller families and the effort to reduce construction investment.

Another comparatively new development is the use of cased openings instead of doors between rooms. The utilization of space formerly "killed" by the swing of doors, especially around closets, has greatly simplified interior arrangement and disposition of furniture. Partitions of minimum thickness aid materially in translating these and other hoped-for space economies into realities.

Streamlined Partitions in Good Taste

In a widely publicized suburban development near New York City, with homes ranging from $4,000 to $18,000, the trim 2-Inch Partitions with cased openings received very favorable comment. Also a part of these designs were modern fenestration, including corner steel casement windows with narrow muntins; and artistically hand-crafted wall surfaces and the modern "streamline" trends in furniture and home furnishings.

In brief, among modern designers, the massiveness of the old-time bulky partitions has been eliminated. Their practice calls for a partition to be as thin as possible when it has no functional purpose except to partition off space in a particular occupancy

5. How To Create Larger Rooms When Rearrangement Is Impractical

Structural conditions sometimes prevent advantageous redesign or rearrangement of rooms to permit concentrating the space saving of 2-Inch Partitions into certain areas. In these instances the saving in space may be used to increase the size of one or more of the rooms or to decrease the size of the building.

This condition obtained in the 9 room house, the second floor plan of which is shown in *Figure 9*. Here the non-bearing 2 x 4-inch wood stud partitions were replaced with 2-Inch Metal Lath and Plaster *(indicated in red)*. Practically every room was thereby made 4 inches larger in at least one dimension.

Savings in Construction Costs:

In the building represented in *Figure 9*, thick partitions (if used) would occupy space aggregating 32 square feet or 259.04 cubic feet on one floor; and for the entire house, approximately 500 cubic feet more than were required for 2-Inch Partitions. *At 40 cents per cubic foot for buildings of this grade, this achieves a saving of $200.00.*

6. Savings In Flat Buildings

In *Figure 10* (below) are illustrated the savings in construction costs obtainable in a typical 3-story flat building. Using 2-Inch Partitions in place of the 2 x 4 non-bearing partitions in the original layout permitted the shortening of the building as shown.

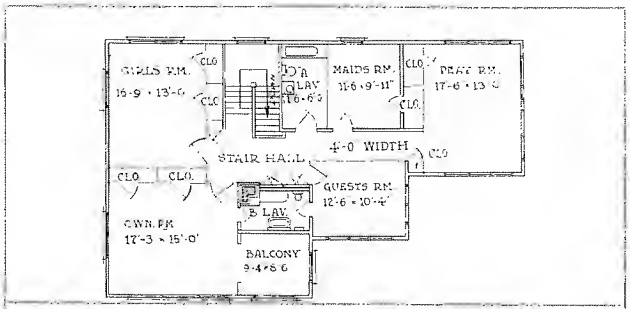


Fig. 9 Two-Story Dwelling Showing Non-Bearing Partitions (Red) of Metal Lath and Plaster.

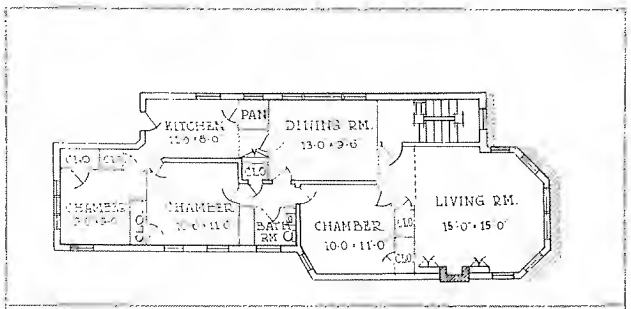


Fig. 10 Three-Story Flat In Which Solid Metal Lath Partitions (Red) Reduce Construction Volume.

Savings Permit Fire-Protecting Entire Building

The saving is approximately 3½% *(shown in shaded red)* of the total occupied floor area. At current wage scales, cost of materials, etc., the total saving is more than sufficient to provide a construction having a full one-hour fire rating for all parts of the building, including particularly the wood-joisted floors; and with the very important additional advantages of better plastering on Metal Lath because of its minimum upkeep expense for redecorating and repair of plaster cracks.

7. Greatly Increased Incomes in Large Non-Fireproof Apartments

One Extra Suite Per Floor Adds Almost 12% To Income: The financial advantages of using 2-Inch Solid Partitions is graphically illustrated below. The upper floor plan shows a typical 3-story eleven suite kitchenette apartment building with 2 x 4-inch partitions of ordinary lath and plaster (total finished thickness 5½ inches) excepting for corridors, stairways and between apartments, where the building code requires studding protected by Metal Lath and Plaster. Estimated cost for land and building was $100,000.

The lower arrangement shows the floor plan redesigned with 2-Inch Solid Partitions *(in red)* substituted for the 5½ inch wood stud type for all non-bearing partitions, except those needed to carry plumbing and service piping. Note that the additional floor space thus made available in the rear (with chimney relocated and closet space rearranged) makes it possible to provide *One Additional Apartment on each floor* of about the same average size.

The cost for this increased income-producing space figures approximately $1,200 for three additional sets of plumbing, and about $300 for the extra partitions for the three added apartments. Otherwise, partition construction remains about the same, and all other construction *(floor, roof, walls, etc.)* is unchanged.

Gross annual rental income from the improved building, at prevailing rentals, amounts to $17,460—or *$900 more* than the original design with thick partitions. After deducting 10% for interest, taxes and depreciation on the respective total investments, the revised building with solid partitions shows a *net gain in annual income of $750.* This would liquidate the extra original cost in less than 24 months; leaving a permanent increase of 11%-plus in annual income.

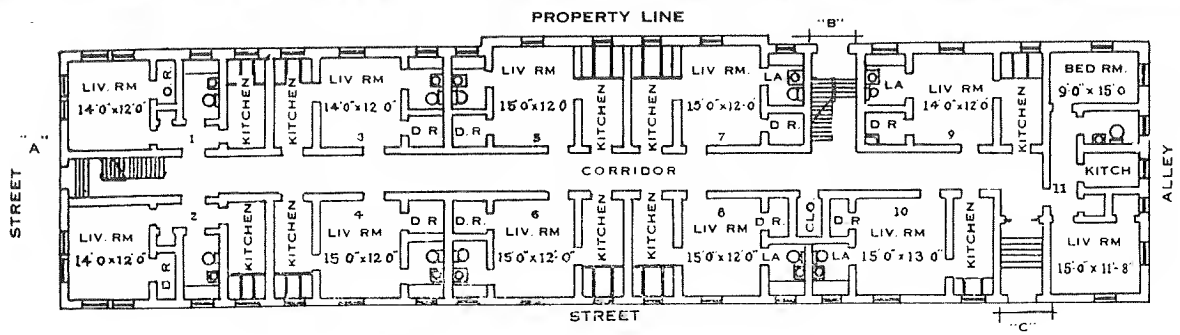


Fig. 11.

ELEVEN APARTMENTS IN ABOVE LAYOUT

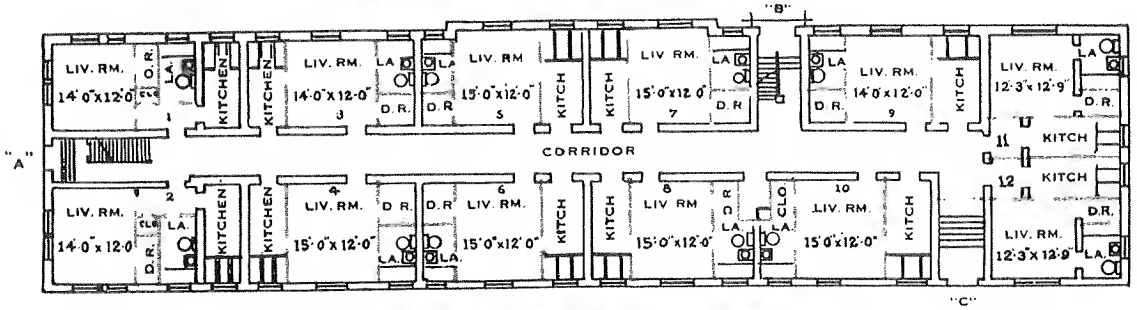


Fig. 12.

TWELVE APARTMENTS WITH 2-INCH PARTITIONS

(Upper) Wood Stud Partitions Throughout — Gross Annual Income $16,560.

(Lower) Space saved by Metal Lath and Plaster Partitions Creates Additional Apartment Gross Annual Income of $17,460.

Use in Modern New York Apartment

The large structure pictured in *Figure 13*, while not fireproof, was fire-protected by the general use of Metal Lath and Plaster for solid partitions within apartments, highly sound-resistive double partitions along corridors, and on the underside of wood joisted ceilings throughout. Metal Stud and Metal Lath Partitions are particularly suited for use in buildings of the wood-joisted type because their light weight imposes no serious floor loads, and because their monolithic reinforced construction is best able to resist the shrinkage stresses inherent in the lumber used in the floor construction.

8. Antiquated Building Codes Hamper Needed Construction

The important need for modernizing building codes to encourage construction of non-fireproof apartments merits a brief discussion here. Statistics show that ordinarily a large part of new construction for residential purposes is non-fireproof and of the multiple dwelling type.

Unfortunately, some antiquated building codes still require bearing or non-bearing masonry walls between each and every apartment in non-fireproof buildings — even those of only three stories and basement in height. Such outmoded code requirements, by making construction costs prohibitive, have had the effect in many cities of discouraging the construction of multi-family dwellings.

9. Modernized Codes Recognize Solid Metal Lath Partitions, Reduce Costs and Increase Rental Income

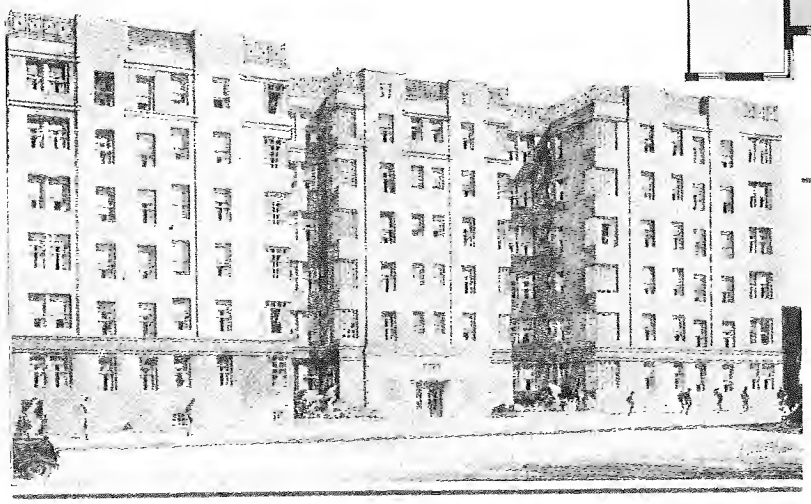
Modernized building codes have solved the problem of providing adequate protection without undue cost, and thus stimulated necessary construction. They properly require masonry division walls in non-fireproof apartments only at intervals bounding up to 4 apartments or areas not exceeding 4,000 square feet, and thereby permit less costly construction for intermediate separations. Within these area limitations, with the exception of corridor and dividing partitions which are required to be fire protected for a 1-hour rating *(Metal Lath and gypsum plaster being the accepted standard protection)*, any type of plastered partition is usually permissible. Wood joisted ceilings, however, are also required to have Metal Lath and gypsum plaster protection so as to provide 1-hour rated construction. No other commonly used ceiling finish provides equivalent protection.

Under these code provisions, Solid Metal Lath Partitions, which now have official ratings up to 2¾ hours *(depending on the type of plaster)*, may be used for non-bearing partitions. Certain types of metal stud bearing partitions also have high ratings.

The typical Kitchenette Apartment, projected in *Figure 14* on the opposite page, illustrates the space-saving under a modern building code. This plan makes possible the addition of a dinette to Apartments 2 and 3 on each floor, as shown shaded in red. Each dinette increases rental income $12.50 per month. The total increase for the building is $75.00 a month or $900.00 per year.

2-Inch Metal Lath Partitions Save 7% of Construction Cost

Instead of increasing income the builder can elect to deduct the space saved and build a smaller building.



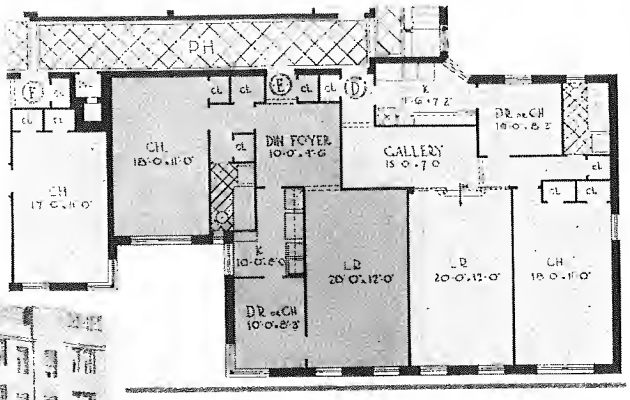


Fig. 13. 245 W. Madison, New York City. Built in 1938; Arthur Weiser, Architect.

The Space Economy of 2-Inch Solid Partitions Is Readily Apparent from this Typical Layout.

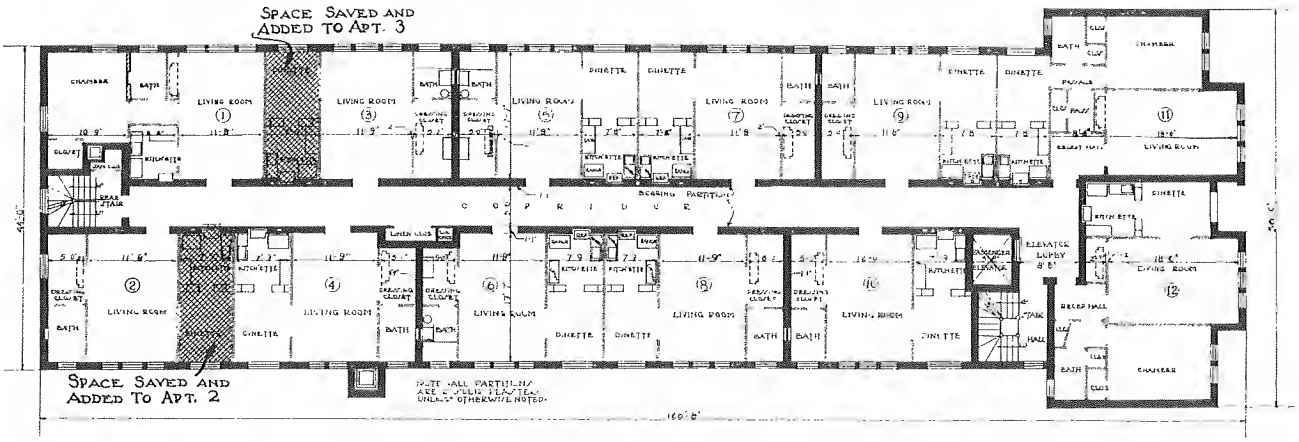


Fig. 14. Modernized Building Codes, by Recognizing 2-Inch Metal Lath Partitions as Fire Barriers, Increase Rentable Areas.

In the 36-apartment building of *Figure 14 (above)* this represents a volume saving in construction costs of $4,780. This, with the $2,110 saved by eliminating certain masonry walls, makes a total saving of $6,890, or nearly 7% of the actual cost of $100,000.

10. Space-Economy Imperative to Financial Success of Fireproof Housing, Apartments, Hotels

With their tremendous floor areas, and their great number of rooms and partitions per floor, fireproof housing developments, apartments and hotels offer the greatest opportunities for space saving.

That space-economy is a matter of prime importance to hotel managements, is evidenced by the diagrams of *Figures 16, 17 and 18* reproduced on the following page, with permission, from one of a series of advertisements in a recent nationwide campaign by the Hotels Statler.

The space saved by using 2-Inch Solid Metal Lath and Plaster Partitions instead of other types having finished thicknesses of 4½ inches and upward is *an important income-producing asset* which should command their use in promoting the financial success of housing or hotel projects.

Masonry Partitions In Typical Hotel Consume 10% of Floor Area

The wastefulness of thick partitions is tabulated in *Figure 15* below. This shows the actual areas and percentage of the total floor area occupied by partitions of various thicknesses for a typical hotel room. It proves that 4½-inch partitions occupy 9%; and 5½-inch partitions 10.85%, as compared with less than 4% for 2-Inch Solid Partitions. *Therefore partitions 4½ inches thick occupy 5% more of the gross floor space than 2-Inch Partitions; and 5½-inch partitions, practically 7% more. This is useful area, which by re-design or rearrangement can be converted into income-producing space.*

On the basis of prevailing figures, construction of the average fireproof apartment or hotel costs 50 cents per cu. ft. Therefore, where construction volume can be reduced through the space-savings of 2-Inch Solid Partitions, it will, as shown in Figure 15, reduce construction investment as much as $56.70 to $77.90 per room as compared with 4½-inch and 5½-inch partitions.

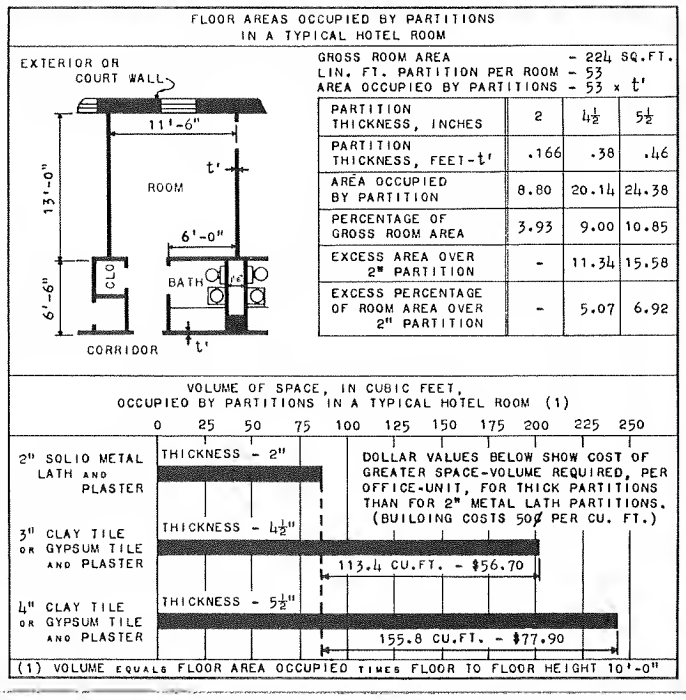


Fig. 15. Relation of Hotel Partition Thicknesses to Floor Areas and Space Volumes Occupied.

Figs. 16, 17, 18. Scale Models are used by Hotels Statler in space-saving replanning of guest rooms (Fig. 16); for modern styling and convenience (Fig. 17). Functional Furniture Designs lend the modern touch and improve utility (Fig. 18).

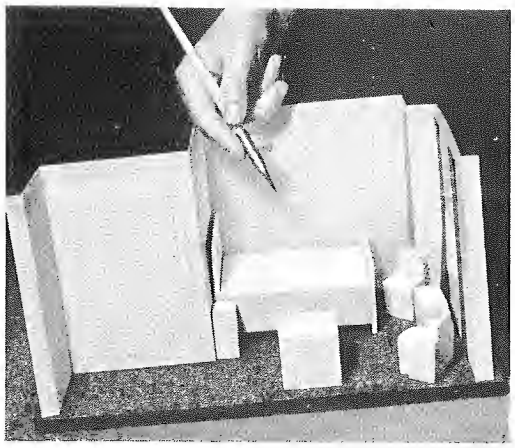


Fig. 16.

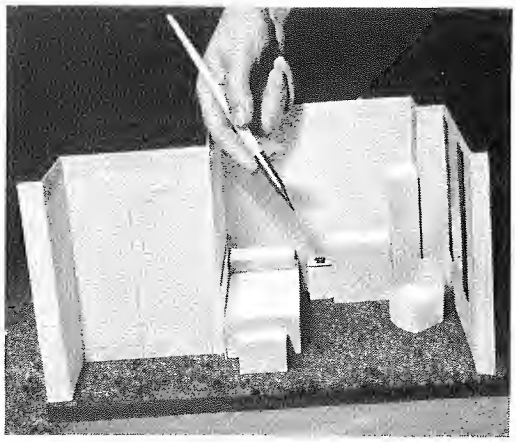


Fig. 17. (above)

Fig. 18. (below)

2-Inch Partitions Add 25 Rooms and $30,000 to Hotel's Income

A striking example of space savings is The Neil House, Columbus, Ohio in *Figure 20*. Floor areas A, B, and C were gained by using 2-Inch Partitions for all interior subdivisions instead of the old-fashioned 4½ and 5½-inch masonry partitions. These areas represent the cumulative space savings in the partitions between rooms, around bathrooms and closets and in the corridors. This total saving in space resulted in *three additional guest rooms per floor*.

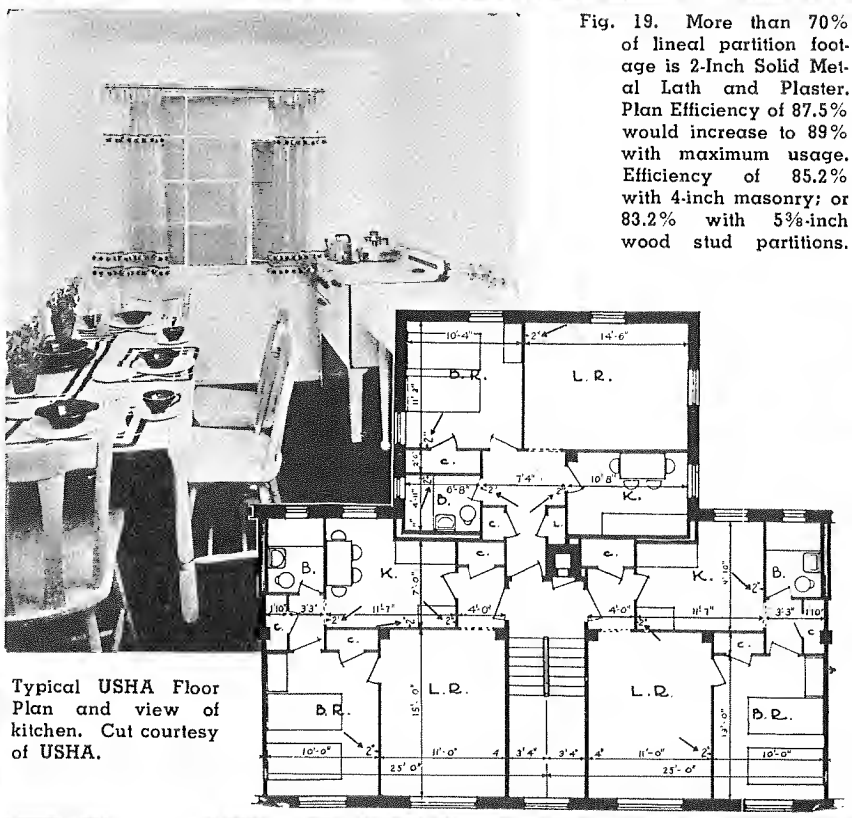
In its 8½ floors, the owners of this hotel thus gained 25 extra rooms. At $3.50 per day, this means an added income of $87.50 daily; or an increase of more than $30,000 per year. Capitalized at 10%, this represents annual income on a building investment of $300,000; whereas the added construction and equipment of these extra 25 rooms actually required only a fraction of this investment.

Costs Down; Income Up

Here the architect has given the owner a definite competitive advantage by reducing fixed charges, taxes, etc., and at the same time increasing earning capacity.

Save $35,000 In Construction Volume Of 8½-Story Hotel

By applying the graphic scale illustrated in *Figure 15* on Page 15 to the Neil House Plan *(Figure 20)* we find this situation: To provide the same number and size of rooms, using 3-inch masonry (finishing 4½ inches thick) as were obtained with 2-Inch Solid Partitions, would require an increase in size of building. At 50 cents per cubic foot, this would amount to $35,000. The corresponding increase in construction volume with 4-inch masonry partitions would amount to more than $48,000.



Typical USHA Floor Plan and view of kitchen. Cut courtesy of USHA.

Fig. 19. More than 70% of lineal partition footage is 2-Inch Solid Metal Lath and Plaster. Plan Efficiency of 87.5% would increase to 89% with maximum usage. Efficiency of 85.2% with 4-inch masonry; or 83.2% with 5⅜-inch wood stud partitions.

SPACE ECONOMY

Savings of these proportions have focused attention on the desirability of using 2-Inch Solid Partitions. As a result they have been built into thousands of commercial and apartment hotels, many of which are illustrated or listed elsewhere in this book.

For Fullest Advantage, Plan Space Savings In Original Layout

In hotel planning, as with most other structures, portions are assigned to corridors, stairwells, elevator shafts, service room, pipe shafts, etc. Although these must conform to building code and convenience requirements, the architect is given considerable leeway in their location. Therefore, knowing that 2-Inch Partitions will be used, he can so maneuver the location of shafts, corridors, guest rooms, etc., that the cumulative space savings of 2¼ to 4 inches on each partition can be turned into revenue-producing room at desired locations. *Only in this way can the full space-saving advantages of 2-Inch Metal Lath Partitions be realized.*

2-Inch Solid Partitions Selected for 90% of Large-Scale Housing Projects

The United States Housing Authority (formerly PWA) has long recognized the space saving of 2-Inch Solid Metal Lath Partitions. A typical standard plan is found in *Figure 19*. Every foot of usable space must be conserved so that the funds available will house the maximum number of families. Similar close figuring was needed to provide closet space and the extra couple of inches needed here and there to make furniture and household equipment conveniently usable. In fact, when wood stud partitions were specified in one project, the additional space required to accommodate the thicker partitions necessitated radical redesign and enlargement of the project, otherwise some of the rooms would have been below minimum requirements.

The close study given to the economies of housing, by the nation's leading architects and engineers who were drafted for planning and carrying out the vast housing program sponsored by the Public Works Administration, resulted in their choice of 2-Inch Solid Metal Lath Partitions for well over 90% of the pro-

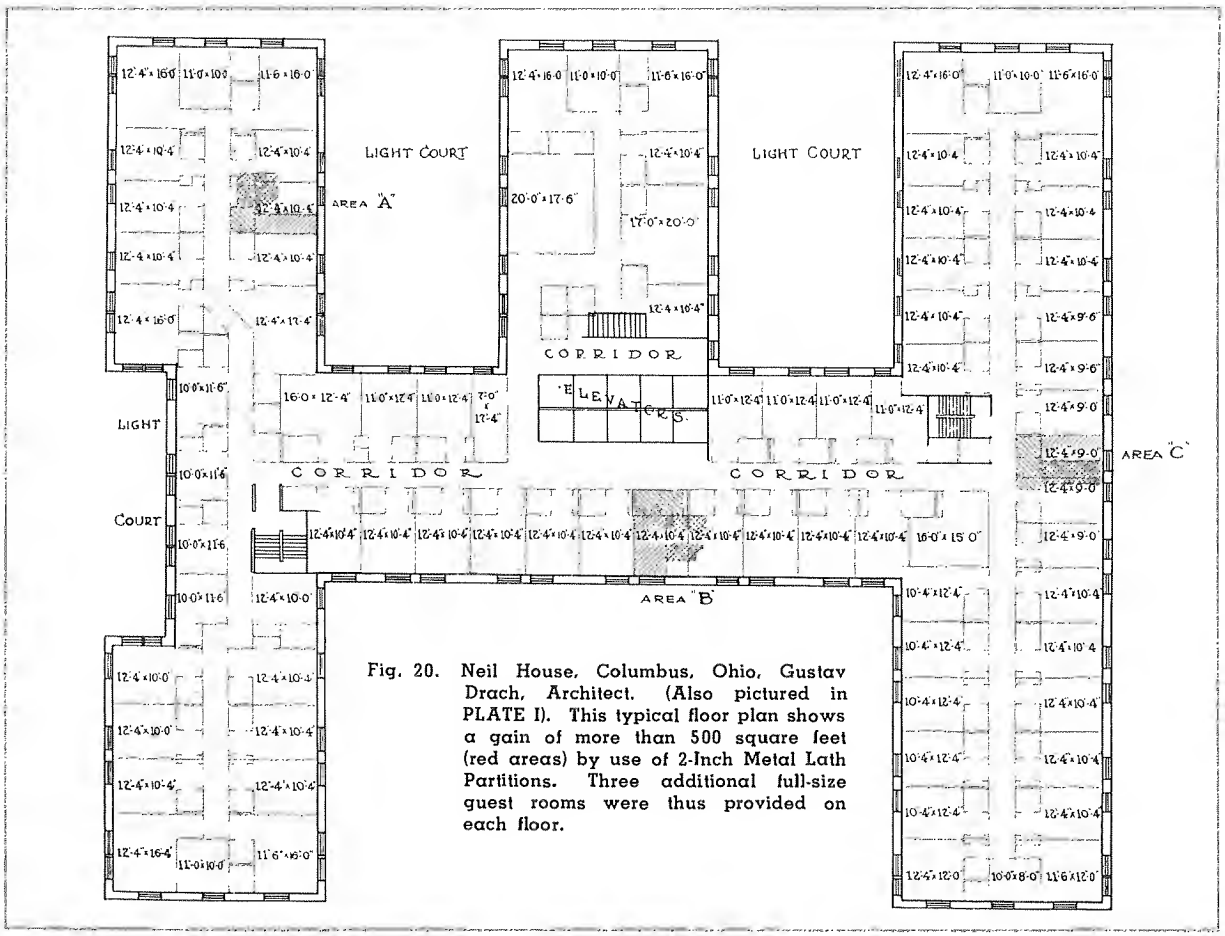


Fig. 20. Neil House, Columbus, Ohio, Gustav Drach, Architect. (Also pictured in PLATE I). This typical floor plan shows a gain of more than 500 square feet (red areas) by use of 2-Inch Metal Lath Partitions. Three additional full-size guest rooms were thus provided on each floor.

jects completed to date. Equal or superior to other commonly used types of partitions in the many other factors governing choice of construction, their tremendous advantage in space-economy definitely established their pre-eminence. The lead of government approval in the Jane Addams and Julia Lathrop projects in Chicago; the tremendous Redhook and Queensbridge jobs in New York City and many others, has been followed by architects on privately financed housing such as the gigantic Metropolitan Life Insurance Company "Parkchester Houses" in New York City, and by many others. *See* PLATES I AND II.

11. Use of Space Saving Partitions Increasing In Office Buildings

The cost of usable space bulks importantly in determining the prospective tenant's choice of office quarters. With space selling upon the customary per-square-foot basis, with measurements from corridor face to the glass surface in exterior walls, the Building Owner or Manager offering *5% more usable area* for the same rental (and at no extra cost to himself) is in a fortunate position when vacancies in the neighborhood are plentiful. When the time comes, as it undoubtedly must, that space is rented on the basis of unencumbered *useful* area, the owner who adopts 2-Inch Solid Partitions as standard will net from 4 to 7% more income than with an obsolete, thick-partitioned building.

The space saving advantages of 2-Inch Solid Partitions in office buildings, with their myriad division walls and partitions, are outstanding. For every five lineal feet, a 2-Inch Partition creates *one extra square foot of usable* area when compared with a 4½-inch partition. And every square foot of space has an annual rental value ranging upward from $2 per square foot, based on figures given in the "REPORT ON MERCHANDISING OF OFFICES," prepared by the Institute for Research in Land Economics and Public Utilities, Northwestern University, Evanston, Illinois.

Analysis of Rentable Floor Space Consumed by Partitions

Efficiency of modern building design is determined by the amount of construction necessary to produce one square foot of useful floor area. In *Figure 21*, showing a typical office layout, note that 4½-inch and 5½-inch finished partitions consume respectively 4.13% and 5.68% more gross area than do 2-Inch Metal Lath Partitions. These thicker partitions *increase* by similar percentages the volume of construction required per unit of useful floor area produced, as compared with 2-Inch Metal Lath Partitions. The latter, therefore, have the higher design efficiency.

Use of 2-Inch Solid Partitions Provides Additional Area Valued at $11,660

Applying the relative space efficiencies of *Figure 21* to the floor plan of the 10-story Office Building in *Figure 22* we find that 2-Inch Solid Metal Lath and Plaster Partitions, used instead of 4½ and 5½-inch masonry, *gained 583 square feet.*

At an average rental of $2 per square foot, the owner, *by contemplating the use of 2-Inch Partitions in the original layout*, thus provided additional area equivalent to $1,166 per floor. This represents a total of $11,660 for the building, or an increase of more than 4% yearly.

Smaller Land Investment Required Saves Builders Thousands

Where ground values are high, the space saving features of 2-Inch Solid Metal Lath and Plaster Partitions offer tremendous savings. These *ground area savings* correspond to the savings in occupied floor area, as compared with thicker partitions, shown at the bottom of the upper table in *Figure 21*. In the building projected in *Figure 22*, note that they save 5.68% in total ground area over 5½-inch partitions. Data compiled by the National Association of Building Owners and Managers (adjusted by the author as of

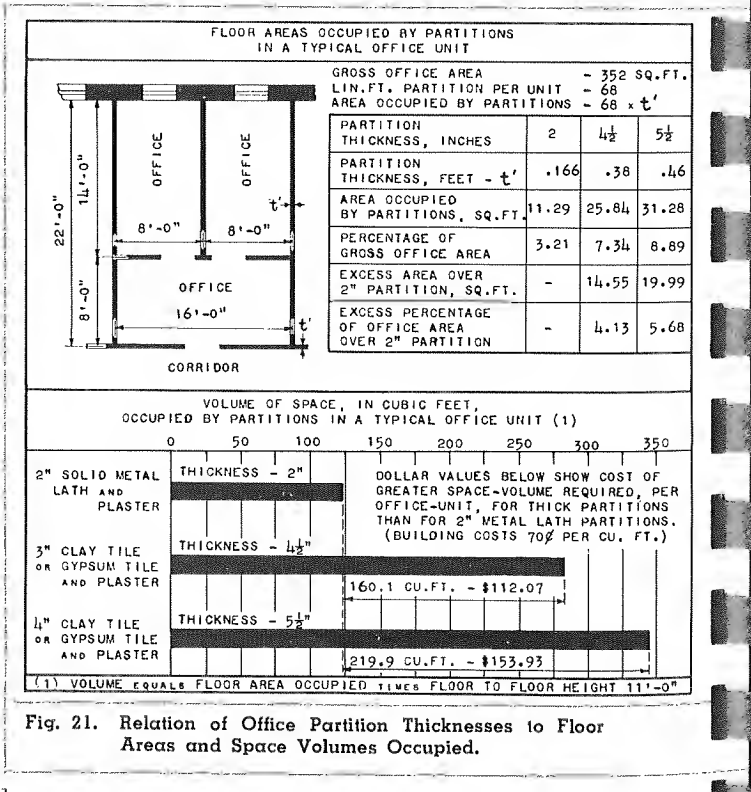


Fig. 21. Relation of Office Partition Thicknesses to Floor Areas and Space Volumes Occupied.

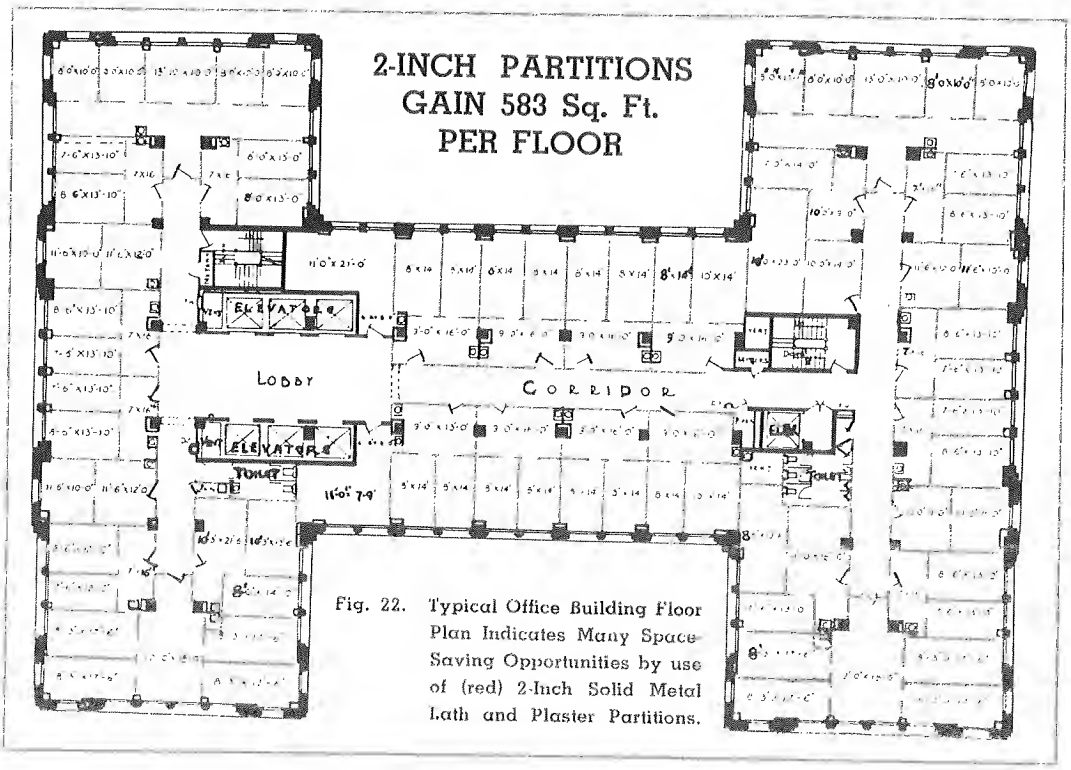


Fig. 22. Typical Office Building Floor Plan Indicates Many Space-Saving Opportunities by use of (red) 2-Inch Solid Metal Lath and Plaster Partitions.

1940) reflect land values of approximately $4 per square foot of rentable area in the average office building. Accordingly the 5,830 square feet saved with 2-Inch Solid Metal and Plaster Partitions in this 10-story Office Building represent *a saving in land investment of $23,320.*

Reduced Cubage Cuts Construction Costs and Fixed Charges

The current cost of office building construction with masonry protected steel framing and using stone or brick and stone exterior, ranges between 60 and 80 cents per cubic foot, with an average of 70 cents. Using 2-Inch Partitions, the average office suite of *Figure 22* requires 175.0 cubic feet less volume of building than with 4½-inch dividing and 5½-inch corridor partitions. (See volume diagram *Figure 21.*)

Now if the total cost of the building were decreased in direct proportion to the volume, the owner would save 175x70 cents or $122.50 for the average suite. But since the cost of only about half of the items will be directly affected by a volume change, a saving of only one-half, or 35 cents per cubic foot will be assumed. For the typical suite this will be $61.25. For the 10-story building of *Figure 22,* the 75,790 cubic foot reduction at 35 cents represents a *first cost saving on the same scale, of $26,527.* The total savings in land and construction investment, amount, therefore, to $49,847.

On the usual basis of 10% for interest, taxes, depreciation, etc., *annual fixed charges can thus be reduced over $4,985 by using 2-Inch Solid Partitions in place of thicker masonry partitions.*

Savings of this magnitude will give one building a decisive operating advantage over others equally well located.

Three Additional Advantages In Office Building Construction

First: Two-inch partitions, because of their light weight, effect savings in dead load which may amount in some instances to 100 pounds per lineal foot, thereby making possible substantial economies in structural design and foundations, particularly in tall buildings. Further details will be found in CHAPTER IX.

Second: New methods and broader construction experience have effected cost economies greatly. Normally 2-Inch Solid Metal Lath and Plaster Partitions can now be built for approximately 20% less than commonly used masonry types. See CHAPTER IV.

Third: Referring to the subjects of privacy and quietness, the "REPORT ON MERCHANDISING OF OFFICES", quoted on Page 18, shows that 84% of the

tenants reporting occupied an average of less than 3,000 square feet of space; and of these, a large percentage required less than 1,000 square feet. Thus in the average office building there will be numerous divisions of space, each requiring privacy and a degree of freedom from the annoyance of external noise. For use in offices 2-Inch Solid Metal Lath Partitions have very satisfactory sound insulation properties. For complete information upon the sound insulation properties of 2-Inch Solid Metal Lath Partitions see CHAPTER VI.

Facts Relating to Salvaging Materials and Partition Relocation and Alteration

A study made by George R. Bailey, formerly Research Engineer of the National Association of Building Owners and Managers, shows that only *one out of eighteen jobs on which actual cost records were kept, permitted salvage in the wrecking of block partitions.*

The Sheridan Trust and Savings Bank of Chicago confirmed this after a study of carefully kept cost statistics. The special precautions required to prevent damage to the blocks and the resultant great labor cost for this and for cleaning the mortar off to make them re-usable are not warranted by the possible savings, therefore *no attempt is now made to save the blocks.*

Although it is practical to remove and relocate Solid Metal Lath Partitions to make space changes requested by tenants, in most instances it is cheaper to take the partitions down entirely and re-build them. A 2 x 2-inch wood nailing strip, or channel runners, secured to floors and ceilings, will simplify removal and reconstruction.

This method, used on occasion by members of the Cleveland Association of Building Owners and Managers and by builders on the Pacific Coast and others, is described and illustrated in PART II of this Handbook.

Cutting openings into old partitions and closing up old ones is readily accomplished in solid partitions because channel studs afford convenient "breaking-in" places at frequent intervals. Old lath and channels can be cut away with the hack saw, and new installed by splicing to the nearest studs and lath either side. New door buck details also permit quick assembly in solid partitions.

Thus, in *mobility, salvage* and *alterations,* Solid Metal Lath Partitions compare favorably with masonry types.

Recent Developments In Partitions

In addition to the recent notable increase in use of Solid Metal Lath Partitions, there have been marked changes and economies in the methods of building Metal Lath and Metal Stud Hollow Partitions. Now many architects and builders have adopted these types of partitions for corridor and tenancy dividing partitions, frequently in combination with 2-Inch Partitions used to sub-divide the space between. *See* CHAPTER X.

Prefabricated Partitions are usually units of wood, of plywood, of sheet metal, or pressed asbestos-cement panels, etc., with or without glass panels.

The mere labor cost of erecting and removing and re-erecting prefabricated partitions is probably less than for Solid Metal Lath or masonry partitions, etc. However, the first *cost-in-place,* of removable type office partitions with their necessary attachments, is several times as large as that of Solid Metal Lath Partitions which cost in the neighborhood of only 22 to 28 cents per square foot.

Where partition changes may be expected at relatively frequent intervals, the larger investment in the prefabricated partitions may be justified by the recurring saving in assembly expense.

However, actual experience records show that partitions in most buildings used for commercial purposes *(except in government-occupied office structures)* require relocation at comparatively infrequent intervals through the years. Therefore, it is much cheaper to use the very much less costly 2-Inch Solid Partitions and, as often as occasion requires, tear them down and build them anew, than to entail the very large investment in so-called removable partitions.

Special Advantages of Plastered Partitions

Both Solid Plaster Partitions and the thin prefabricated types may be classed as space-savers. But there is one important advantage peculiar to the plastered types of construction: *Their exclusive, seamless, sanitary finish betokens privacy and the permanency of the well established institution,* that permanency which belies the impression of "*temporary quarters*" so often associated with enterprises located in offices with movable partitions.

Further, plastered partitions may be decorated with any and all paint or paper finishes. These new finishes are available in a variety of color and richness of pattern or material, and may be varied from time to time to suit the requirements of the clientele; a difficult, if not impractical achievement with many types of prefabricated partitions.

The newer developments in modern steel frame window design now make it possible to build almost any type of glass into borrowed-light partitions of *Solid* or *Hollow* Metal Lath and Plaster. Thus, the full advantages of space saving may be combined with the decorative and lighting advantages of large areas of clear, prismatic or opaque glass.

This feature is expected to become increasingly useful in the design of office buildings, medical arts buildings, architects' and engineers' drafting rooms, studios, hospitals and educational structures.

CHAPTER IV

Comparative Construction Costs of Various Types of Partitions

Digest and Recommendations:

Frequently overlooked are certain *indirect* items of costs which are not a part of the individual contracts for masonry, lathing and plastering. These indirect items — plus direct items — reflect a decided advantage in favor of Metal Lath Partitions as shown by the following tabular comparisons:

TABLE IV. Average Construction Cost Savings Per Square Yard of Partition

2-INCH METAL LATH and PLASTER SAVES:	INDIRECT	DIRECT	TOTAL SAVINGS
— Under Gypsum Block ..	$0.27	$0.61	$0.88*
— Under Clay Tile	0.49	0.61	1.10*
HOLLOW METAL LATH and PLASTER SAVES:			
— Under Gypsum Block ..	0.40	0.20	0.60
— Under Clay Tile	0.63	0.20	0.83

* These are in addition to the savings in Construction Volume Costs attributable to Space Savings in CHAPTER III.

Costs Reduced by Improved Methods Of Partition Installation

During recent years, time saving "wrinkles" have been developed, resulting in the erection of 10% to 20% and more channel iron stud construction per man per day. In addition to this the Lathers' International Union has given support by developing expert mechanics for solid partition erection and consequently a considerable number of mechanics specially skilled in this particular type of installation is available.

Specify Metal Lath Partitions Outright or As An Alternate

To secure full advantage of the savings detailed in the following, and the only way in which an architect can be certain of protecting his client's interest, he should use the details recommended in PART II and specify outright or call for an alternate bid on Metal Lath Partitions either in the plastering or in the lathing specifications and an allowance for them in the masonry contract. He should also see that the carpenter, millwork and other contractors are instructed to so prepare their bids that the savings in cost for furnishing and applying bucks, grounds and the trim on Metal Lath Partitions can be properly credited to the use of these partitions.

Low Cost for Solid Partitions On Large-Scale Housing

The relative values given in Figure 23 are largely based on 1939 figures from large contractors in New York and Chicago and check with representative averages.

That 2-Inch Solid Metal Lath Partitions can be profitably built by the contractor at considerable savings under competing types of construction has been demonstrated on innumerable occasions in competitive bidding on recent Federal housing projects. The government learned that it could actually obtain 2-Inch Solid Metal Lath Partitions *for less first cost* than other fire-resistive types. Consequently they have been utilized almost exclusively for subdividing space within apartments on fireproof Federal housing projects, typical illustrations of which are shown in PLATE II.

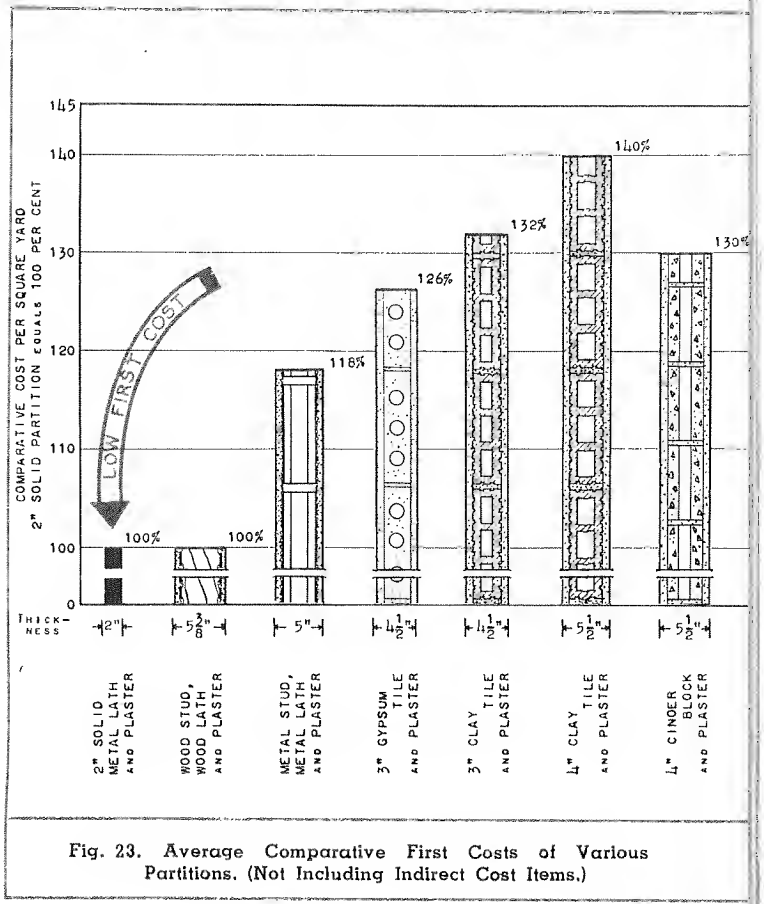


Fig. 23. Average Comparative First Costs of Various Partitions. (Not Including Indirect Cost Items.)

1. Low First Cost Big Factor In Building For Investment

Cost, next to space economy, is shown by careful investigation to be the most important single factor in the selection of types of partitions for a large majority of all classes of structures and occupancy. In fact it is rated as either of first or second importance in apartments, housing, hotels, offices, and mercantile buildings. See TABLE I, Page 8.

As most structures are built for profit the great weight attached to first cost is not surprising, in view of the effect upon building operations of present high average construction costs, increased land values, high taxes, etc.

Sight should not be lost, however, of the fact that space economy discussed in CHAPTER III, is also a cost factor in that it affects the amount of construction necessary to produce a unit of usable floor area. Therefore economy and cost should be considered as complementary factors.

2. Definition of Costs

Partition cost economy as discussed in this chapter, is not merely labor and material cost necessary to build so many square feet of wall; but is the ultimate total first cost to the owner of a particular type of partition construction.

This first cost is the sum total of the costs of those portions of the plastering, lathing or masonry, carpentry and millwork contracts which apply to the partitions, plus those items of general building cost which are dependent on or affected by the type of partition employed and which, as they are increased when one type of partition is employed or decreased by another type, may be rightfully added to or subtracted from the plastering, lathing and other items in order to arrive at a proper total first cost.

3. Costs Differ With Geographical Location, Freight Rates, Etc.

The cost per square foot of partitions of identical construction varies with geographical location, and also because of differences in construction methods which have been developed independently; and by variations in cost of materials as affected by freight rates, differences in wage scales, and other local factors.

The price ranges discussed herein are based on actual cost information on specific jobs. They are typical, but no partition cost remains constant even in a given locality due to many factors, such as job conditions, etc., which from time to time affect cost of partitions of identical construction. (See Article 13 of this Chapter.) For these reasons and those given in the preceding paragraph no actual cost figures can be considered as applying to all parts of the country or as effective over long periods. However, the *comparative difference* in *average* costs as analyzed here have been found to be reasonably accurate over a period of years.

4. Elements of Partition Costs

NOTE: For simplification, the first part of this discussion is limited to fireproof types of plastered partitions. Comparable cost items which are substantially identical will be eliminated and the comparison confined to those which differ.

5. ITEM I — Direct Labor and Material Costs

Transportation Charges

Weight and transportation charges are important factors in the delivered cost of materials, and particularly in the cost of plant-fabricated masonry units. These charges not only play an important part in determining the delivered cost of such units but, in the case of the heavier units, limit the choice of products to the proximity of the source of supply.

In masonry, the clay tile alone constitutes 18 to 20 pounds of the total finished partition weight of 28 pounds per square foot. In gypsum blocks the weight ratio is 10 to 12 pounds in 20. The bricks in a 4-inch partition represent 80% of the weight.

In contrast, Metal Lath and Metal Channels weigh only 3% (or ½-pound) of the square foot total of 18 pounds. Thus, even when the freight rate per hundred pounds on finished steel is several times more than for masonry, it is a comparatively small item in the total cost. Therefore, Metal Lath and Channels can be economically shipped and used in places thousands of miles from the factory.

Plaster and sand make up the remaining materials in Metal Lath Partitions as they do in masonry types. In a majority of cases the sand is of local origin, and both are widely distributed at uniformly low freight rates. However, Metal Lath Partitions use a larger percentage of these low cost mineral products in proportion to dead weight or surface area than any other type. Therefore, with respect to cost of materials of construction, Metal Lath Partitions are especially favored.

Wage Scales

At present, wages for mechanics in the mason, lathing and plastering trades vary in different cities, but the differential between them in any particular locality is not large.

Price Range for ITEM I

In the United States the prevailing total cost for masonry partitions such as gypsum block, cinder block or clay tile 3 to 4 inches thick, including labor and

material for erection and contractor's overhead and profit is 15 to 23 cents a square foot or $1.35 to $2.07 per square yard, both sides included. This is exclusive of plastering, and incidental charges and sales taxes, social security, etc.

The total cost for Solid Metal Lath Partitions, including labor and materials, but exclusive of plastering and incidental charges, etc., ranges between 52 cents and $1.08 per yard. (Both sides included.)

The total cost for Metal Lath and Metal Stud Hollow Partitions, as above, ranges between $1.12 and $1.48 per square yard.

On the basis of the foregoing price ranges, it will be noted that a comparison of hollow masonry with the Solid and Hollow Metal Lath constructions, *(each exclusive of plastering)*, shows average costs of $1.71, 80 cents, and $1.30, respectively.

The average difference, exclusive of plastering and incidental items is 91 cents in favor of the Solid Partitions (as compared with the masonry partitions); and the corresponding difference in favor of the Hollow Metal Lath Partitions as compared with masonry is 50 cents. These differences are set opposite Item 1-a in adjoining TABLE V.

TABLE V—Analysis of Fireproof Partition Costs

Quantities Are For One Square Yard Including Both Sides Of Partition

ITEM No.	DESCRIPTION	CONTRACTOR	DIFFERENCE IN FAVOR OF: 3" Block or Tile Plastered Both Sides vs 2" Solid Metal Lath and Plaster		3" Block or Tile Plastered Both Sides vs 4½" Hollow Metal Lath and Plaster	
1-a	Cost of Block and Tile delivered to job, plus labor and mortar for erection vs Cost of Metal Lath and Channels delivered to job, plus cost of labor and erection materials.	Mason / Lathing (Sometimes in plastering contract.)	.....	$0.91	....	$0.50
-b	Cost of Plastering	Plastering	$0.30	....	$0.30	.....
2	Incidental Construction Costs	Various				
-a	Cost of Bucks	Carpentry	.....	.02	....	.02
-b	Anchorage of Bucks	Carpentry	.....	....	....	.....
-c	Grounds or Screeds and cost of application	Carpentry	..... /	.08x / .12z	.... /	.08x / .12z
-d	Metal Lath Reinforcing Strips	Lathing	.....	.027	....	.027
-e	Chases and Stacks for large piping	Mason or Lathing	.....	....	....	.128
-f	Cost of installation of electrical conduit, etc.	Electrical & Plumbing	.01	....	....	.035
-g	Patching grooves cut into block or tile	Lathing or Plastering	.....	.025	....	.025
3	Cleaning up after job	Masonry	.....	.085	....	.085
4	Wood Trim Finish	Millwork	.....	.042	....	....
5	Dead load (Effect on cost of structure)		.....	.00x / .185z	....	.00x / .185z
		TOTAL	$0.31	$1.19x / $1.415z	$0.30	$0.90x / $1.125z

x = Figures for gypsum block; z = Figures for clay, concrete tile.

Net difference in favor of 2-Inch Solid Partitions vs. gypsum..... $0.88 per sq. yd.
Net difference in favor of 2-Inch Solid Partitions vs. clay or concrete.. 1.10 per sq. yd.
Net difference in favor of 4½-Inch Hollow Metal Lath vs. gypsum .. .60 per sq. yd.
Net difference in favor of 4½-Inch Hollow Metal Lath vs. clay, etc.... .83 per sq.yd.

Cost of Plastering Partitions

The plastering contractor's bid will show the difference between the labor and materials for applying 4 to 6 coats *(total for both sides)* with a total thickness of 1¼ or 1½ inches of plaster on block or tile partitions, as against a 1½ inch total for both sides of Metal Lath Hollow Partitions; and a total thickness of 2 inches applied solidly in 5 coats on Metal Lath Solid Partitions.

This difference, which includes profit, ranges at present between 20 and 55 cents per yard and averages about 30 cents more for the Metal Lath Solid Partition measured both sides complete. This is Item 1-b, TABLE V. *The additional cost for Metal Lath Hollow Partitions will range from 10 to 20 cents a yard, each side, and will average 15 cents or 30 cents for both sides, over the cost of plastering on masonry.*

Combined Labor and Material

Combining the lathing or masonry (ITEM 1-a) with the plastering (ITEM 1-b) shows that, on an average, Solid Metal Lath Partitions cost 61 cents per square yard or almost 7 cents a square foot less than masonry block and Hollow Metal Lath and metal stud partitions cost 20 cents per yard less than the masonry.

6. ITEM II—Indirect Construction Costs

(a) Cost of Bucks (Wood)

Two to three times as much lumber is required for rough door bucks for block partitions finishing 4½ to 6½ inches thick as is necessary for 2-Inch Solid Metal Lath Partitions. If steel bucks are used the proportionate increase in materials is not so large. Assuming

lumber at $40 per M, the saving on wood bucks utilizing 8.5 board feet for each 3-foot opening for 2-Inch Solid Partitions in place of 17 board feet for 4½-inch partitions (2 x 6-inch material) is 34 cents where the bucks are plain. Where the bucks are rabbeted (unnecessary for metal lath), the saving is 45 to 50 cents per opening.

For the average hotel suite of Figure 15, Page 15, with approximately 53 square yards of partitions and 3 doors, the saving in favor of Solid Metal Lath Partitions is 2 cents per yard. This is Item 2-a. (Note that with the combined wood buck and trim, Figure 140, PART II, the saving is approximately $1 per opening, or 5¼ cents per yard.)

Metal Bucks: The more general use of solid partitions in the past few years has been paralleled by the greatly increased use of combined metal-buck jamb and trim, as illustrated in PART II for partitions of this type. Consequently, such metal buck and trim is no longer "*special*" and only a little more than half as much steel is necessary for a 2-inch buck as for a 4½-inch buck. Although the saving is not directly proportional, it is substantial. Late 1939 quotations show costs as follows: 2-inch bucks, $4 each; 4½-inch bucks, $4.50 each. Therefore bucks for 2-Inch Partions cost 12½% less than for 4-Inch Partitions; and 13.8% less than for 5-Inch Partitions.

Thus the saving in cost of bucks may be credited to the use of 2-Inch Solid Partitions. Based on Figure 15, Page 15, this will average 3 cents per square yard.

(b) Anchorage for Bucks

Both in masonry and in Metal Lath Partitions a substantial anchor must be provided to secure the buck to the top of the masonry floors. The cost is substantially the same in both cases. In addition to these, block and tile require metal anchors, (usually specified under the head, "Miscellaneous Iron, etc.,") to tie the wood buck to the nearest masonry. These cost extra and the carpenter contractor charges extra for the labor. In Metal Lath Partitions the securing of the nearest channel to the buck is already included in the lather's contract, and there is no extra charge. In current practice anchors from the side and top of the buck to the underside of the ceiling construction above, are provided in Solid Metal Lath Partitions. In Hollow Metal Stud Partitions, sheet metal anchors are attached to the metal buck at intervals (*See Figure 173,* PART II) and the anchors bolted to the metal studs. It is estimated that the cost of these in place will be approximately equal to the anchors used for the masonry.

Therefore, no definite cost advantage can be assigned to either masonry or lath partitions on this, (Item 2-b, TABLE V).

(c) Grounds or Base Screed

Specifications for gypsum block partitions frequently call for wood blocking the full thickness of the partitions to be placed between abutting ends of block units and nailed to one of them, a comparatively slow process. To these, wood strip grounds are attached as a ground for plaster and nailing base for the trim. Again, in clay tile partitions, holes must be punched and wood plugs cut and fitted for the attachment of the strip grounds; or metal plugs must be provided and inserted by mason contractors. But in Metal Lath Partitions the steel channels afford frequent and convenient means for attachment of vertical wood blocks and strip grounds at any point.

The average cost of wood grounds in place, in 2-Inch Metal Lath Partitions, is 6 cents per foot of grounds. The cost for two grounds for the base is therefore 12 cents per foot, each side; or 24 cents for both. For partitions 9 feet high this comes to 24 cents per square yard (figured both sides). For gypsum blocks and clay tile the installation costs are 8 cents and 9 cents per lineal foot; or 32 and 36 cents per yard, respectively (both sides).

The saving in grounds in favor of the Metal Lath Partitions compared with gypsum block and clay tile is 8 and 12 cents per square yard respectively (both sides included). This is Item 2-c.

For certain occupancies there is a growing tendency to omit wood base and use metal base or portland cement, or terrazzo, instead. For the cement or terrazzo, metal base screed of the flush or curved-point types and dividing strips have come into extensive use. For the screed itself the cost will be the same regardless of the partition material. But there is a substantial advantage in cost of erection for Metal Lath Partitions (as compared with clay tile for which special nailing supports must be provided), because their metal stud supports are visible and accessible through the open mesh and afford convenient places for attaching the strips at frequent intervals. Gypsum block and lath do not provide a suitable bond or backing against which to apply portland cement or terrazzo; therefore Metal Lath or forms of masonry block must be used against which portland cement can be applied.

It is estimated that the saving in installation expense will favor the Metal Lath Partitions against the clay masonry by approximately the same amount as in the comparison with wood ground installations, as discussed above and recorded as Item 2-c, TABLE V.

Economy in overall installation expense is offered by combinations of sheet metal floor base and floor runners now being extensively used for Metal Lath Partitions as described in PART II, CHAPTER XIV. Since such base can also be used with other materials it is difficult to assign any specific value here for the cost savings of one type of partition as compared with the others.

(d) Metal Lath Reinforcing Strips

To forestall plaster cracks around door openings in block and tile partitions, strips of metal lath about 1-foot wide are always used over the masonry. These strips are either short pieces set diagonally across top of opening at each side, or run from floor to ceiling with a separate strip horizontally across the top. This is an "*extra*" for the lathing contractor. Needless to say this item is never necessary for Metal Lath and Metal Stud Partitions, as they already provide two-way reinforcing which prevents disfiguring cracks.

Assuming the extra to average 50 cents per opening, it will add 2.7 cents per yard to the cost of the block partition of the typical hotel suite. This is Item 2-d.

(e) Chases and Stacks for Large Piping, Ducts, Etc.

Where pipes, conduits and ducts exceed 1½-inch, but are less than 2½ inches in outside diameter, block and tile partitions have an advantage, as no furring is required. With Solid Partitions either a pipe chase or hollow construction is necessary. For Hollow Metal Lath Partitions the space is already provided.

However, necessity for providing chases, etc., in Solid Metal Lath Partitions, where they would not also be needed for the masonry, occurs only seldom. In most instances an effort is made to concentrate all such runs on one wall in one, or in perhaps two rooms in the average housing, apartment, or hotel occupancy, as in *Figure 15*.

Experience has shown that where pipes, ducts, etc., exceed 4 inches in diameter it is always costly to try to conceal them by using thick blocks for the entire partition, or to build a shallow masonry block chase around them, or to attempt to cut and fit blocks around the piping. The blocks should be stopped either side of the pipes and the opening covered with metal lath.

However, in such cases, especially at bathrooms where it is customary to use soil and vent pipes with hub diameters of 4 to 6 inches and more, a pipe chase of free standing furring or a continuous Hollow Metal Lath Partition to conceal and to provide accessibility to the pipes is the most economical construction and should be used regardless of the partition material used elsewhere. Particularly where piping runs horizontally or diagonally in a partition, the use of the chase or Metal Lath Hollow Partition (*See Figure 155;* also PLATE IV), is recommended, as channeling of masonry is expensive and the results not always satisfactory.

Where the Solid Metal Lath Partition is used, chases of this kind are built by furring out, at minimum expense. (See Figure 156, PART II.) Because of these varying conditions no definite cost advantage can be assigned to either masonry or solid partitions on this, Item 2-e.

In the typical hotel room used as the basis of this discussion, the one bathroom wall which would need a row of block each side if block or tile were used, would, for the 6½ square yards required, cost $1.04 per square yard, or a total of $6.76 more than the single Hollow Metal Stud Partition. The figure is one-half of the total difference, figuring both sides of the partition.

Divided among the 53 yards of the room wall-area, this would average 12.8 cents per square yard which is set down in Item 2-e, TABLE II, at a cost saving for Metal Lath Hollow Partitions.

When the $12,000,000 "Red Hook Houses" project in New York City, designed to accommodate 2,593 families in 25 building units, was under construction the associated architects in charge estimated a saving of $36,000 by their use of Hollow Metal Lath and Plaster Partitions for plumbing stack housing instead of masonry walls. (ARCHITECTURAL FORUM, Nov. 1938, pp. 405-408.)

The foregoing reflects a saving of nearly $14 per apartment. Since the double walled partitions have an area of 7 square yards each side or 14 yards for both sides, the average saving for the plumbing enclosure was $1 per square yard each side. This confirms the $1.04 figure used in the second preceding paragraph.

(f) Electrical Conduit, Pipe Installations

Any changes in location of outlets, etc., made before plastering, after block or tile have been erected and fitted around existing conduits, etc., are accomplished with difficulty and at extra expense, by the electrical contractor.

In Metal Lath Partitions the electrician does no tedious chiseling, permitting alterations and additions of outlets, etc., before plastering, at minimum "extra" expense. Conduit is easily tied to lath and channels and just as readily cut loose and relocated. Although it is recognized that first installations in Solid Metal Lath Partitions require a little more time because conduits must be located somewhat more accurately than in thicker partitions, *experience shows that speed is quickly picked up and subsequent installations made without difficulty.*

Furthermore, the complete line of shallow conduit and electrical devices now available (*See* CHAPTER XIV, PART II) facilitate the installations of wiring circuits, so that both for original installations as well as for changes the costs in new 2-Inch Metal Lath Partitions are substantially the same as in thick partitions.

Under the circumstances the probable maximum additional charge for electrical installation in Solid Metal Lath Partitions as compared with masonry is 1 cent per yard. (Item 2-f, TABLE V.)

Hollow Metal Lath Partitions afford savings in conduit installation of 3 to 4 cents a yard compared with masonry partitions.

(g) Extras for Patching Groove and Chases

Grooves or chases, frequently room height, cut in block or tile to conceal conduits must be filled with plaster or covered with Metal Lath so that the surface will be ready for the plasterer. The extra cost will average about 25 cents for each electrical outlet. Metal Lath Partitions require no grooving and no patching.

For the usual conduit runs (except in office buildings where they are provided for in wiring chases), this extra will add 2½ cents per yard to the expense of using block partitions. This is Item 2-g, TABLE V.

(h) Lintels Over Wide Openings

It is generally found most economical to omit the lintel and blocks over openings in tile or block partitions and cover the entire space with metal lath and channels each side. This is an extra over and above the masonry contract. This expense is saved when Metal Lath Partitions are used as they are always carried over openings without change in type of construction.

Such openings, although commonly found in office buildings and in many hotels do not occur in the hotel room of Figure 15 and therefore the ordinary charges covering the extras are not shown in TABLE V.

7. ITEM III—Clean-Up Costs

An item occasionally overlooked, but which frequently runs 5 to 10% of the masonry figures is "cleaning up after the job," to clear away broken tile, etc., and cart it away. Metal Lath Partitions have no comparable expense.

Based on average masonry figures of 19 cents per square foot or $1.71 per square yard, the cleaning up charges against the use of masonry tile will be about 8.5 cents per square yard. See Item 3, TABLE V.

8. ITEM IV—Millwork and Trim

Where wood trim is used the cost of millwork is less with 2-Inch Solid Partitions, than with thicker partitions because of the narrower finished jamb and head. For an opening 3 x 7 feet, the saving is 5.67 board feet.

With finish lumber at $100 to $175 per M for birch, walnut, etc., the additional cost of millwork for openings in partitions 4 to 5 inches thick will range between 50 cents and $1, or an average of 75 cents more per opening, or approximately 4.2 cents per yard of hotel suite partition. This is Item 4, TABLE V. (See also note under discussion of Item 2-a regarding special type of combined wood buck and trim which permits additional savings.)

Where combined metal buck, jamb and trim is used, Item 4 savings do not apply. Refer to Item 2-a, TABLE V. Labor costs for application of trim run about the same for all these partitions.

9. ITEM V—Partition Dead-Load Effect on Costs

The difference in weight between 2-Inch Solid Metal Lath, 5½-Inch Hollow Metal Lath and gypsum block partitions finishing up to 4½ inches thick, is not enough to affect the structural design. But the reduction in dead load of up to 100 pounds per lineal foot for Metal Lath Partitions, as compared with 3 and 4-inch clay or cinder concrete tile, permits a measurable saving in the cost of the structural framework and in the foundations. See CHAPTER VII.

These savings in structural design must be credited to the types of partitions selected. The savings run from 10 to 36 cents per square yard, depending on type of structural frame, area and height of building. Assuming an 8½-story steel-frame hotel building with plan as in Figure 20, the saving will approximate 18.5 cents per square yard. This is Item 5, TABLE V.

10. Metal Lath Partitions Save Up to $1 per Yard

Recapitulation: A study of the figures in TABLE V showing the effect of direct construction and indirect expense items on the cost of various masonry types and Solid and Hollow Metal Lath Partitions, reveals the following:

Item 1 shows the average cost of erecting masonry ready for plastering to be 91 cents per yard greater than the cost of Solid Metal Lath Partions and 50 cents greater than the Hollow Metal Lath Partitions, ready for plastering. It also shows the plastering costs on the Metal Lath Partitions to be 30 cents greater than the plastering cost on masonry, both sides. Combining them leaves a net difference of 61 cents per yard favoring 2-Inch Solid Partitions as against the masonry; and 20 cents in favor of the Hollow Metal Lath Partitions as compared with the masonry. These averages may vary with geographical locations, wage scales, etc., but they agree closely with the approximate advantage in total cost in favor of Metal Lath Partitions which is being quoted by plastering and lathing contractors in many cities.

In addition to the foregoing direct items of saving there are numerous indirect savings: *Items 2, 3 and 4* which are enumerated in TABLE V and will average 30 cents per yard. Furthermore, in tall structures the dead load savings in the structural frame, mentioned in *Item 5*, may reach the important sum of 36 cents per square yard of partition; and in an 8-story building will amount to 18½ cents. Hence the total advantage for indirect items only in favor of 2-Inch Metal Lath Partitions, as compared to clay tile, will be 49 cents per square yard. Combining these with the direct cost savings, total savings of $1, and more, per yard in favor of Metal Lath Partitions are obtained.

11. Cost Comparisons with Wood Lath and Wood Stud Partitions

In many localities Solid Metal Lath and Channel partition costs are so low that they are competing with wood stud and wood, gypsum or fibre lath and plaster partitions which occupy three times as much floor space. 2-Inch Metal Lath Partitions are useful for low cost non-fireproof building such as housing, apartments, flats, dwellings and stores where combustible construction has heretofore largely been used. This is particularly true in buildings of a speculative nature, where economy is the first consideration.

12. Cost of Other Types of Metal Lath Partitions

(a) Sound Insulating Double Partitions

Where maximum sound insulation is desired the Double Metal Lath and Metal Stud Partition (CHAPTER XXII, PART II) is the most economical to build. Both sides complete, it costs less by $1.50 to $2.00 per square yard than a partition consisting of a double row of masonry block or tile. In addition to this there are savings in many of the incidental items described in *Article 6*, this chapter.

(b) Metal Lath, and Wood and Metal Stud Bearing Partitions

Ordinary wood studs, protected on both sides by expanded Metal Lath with ¾-inch of gypsum plaster, are undoubtedly one of the most economical "*nailable*" forms of bearing partitions ever devised, to receive a 1-hour rating. They cost about one-half of the lightest masonry bearing wall when plastered both sides. With mineral wool fill these partitions have recently received the full 1½-hour rating for bearing purposes. Certain types of light steel stud bearing partitions with expanded Metal Lath and wood fibred gypsum plaster facings have recently been accorded ratings of upwards of 2 hours at official testing laboratories.

The many advantages of economy, etc., credited to Metal Lath protected wood and metal stud construction are especially valuable in conjunction with expanded Metal Lath and plaster protected wood, steel and concrete-joisted ceilings. These combinations offer maximum cost efficiency and fire safety.

(c) 2-Hour Rated Non-bearing Wood Stud Partitions

Where wood studding has advantages for construction purposes, it is important to note that a very high degree of fire resistance — *2 hours* — is obtainable by using wood stud partitions plastered with 1-inch of wood fibred gypsum either side, on Metal Lath. The cost will be about 15 cents a yard more for each side than regular sanded gypsum plaster.

13. Necessary Allowances When Comparing Costs

Architects and owners attempting to reconcile estimated costs in comparing various types of partitions, should give full weight to the six following points:

(1) Unit costs will be greater the smaller the yardage of partitions. A 200 yard job will cost 10 to 25 cents a yard more than a 5000 yard job.

(2) Cost to erect partitions will be less in buildings under construction than in old occupied buildings because contractor has wider choice of construction methods.

(3) Costs are less where partitions are being built and plastered at the same time as the walls and ceilings, than when partitions are plastered separately. Plastering can be planned more effectively and the saving may be as much as 5 to 10 cents per yard.

(4) The higher the partitions, the greater the cost; but Metal Lath Partitions can be built to great heights more economically than other types because their light, reinforced construction permits increasing heights with lesser relative increase in amount of materials required. Furthermore, although double scaffolding is necessary in the buildings of tall masonry partitions because of the handling of heavy units, only single scaffolding is required for the usual Metal Lath Partition. Hence the greater the height, the greater the relative saving if Metal Lath Partitions are used.

(5) The thicker the solid partition the greater the cost; but the increase is not in direct proportion, viz.: a 2½-inch Solid Metal Lath Partition costs more than one 2 inches thick, although the difference is only about 10%.

(6) Partitions are built most economically in buildings with long corridors and few closets and minimum of cut-up areas, i. e.: the smaller the proportion of closets to the total partition area the less the square yard cost.

From the foregoing it will be observed that no exact comparison of costs on various jobs can be made; and unless the many factors which have been discussed are given adequate consideration, any figures purporting to show the difference in cost between various types of partitions will bear investigation.

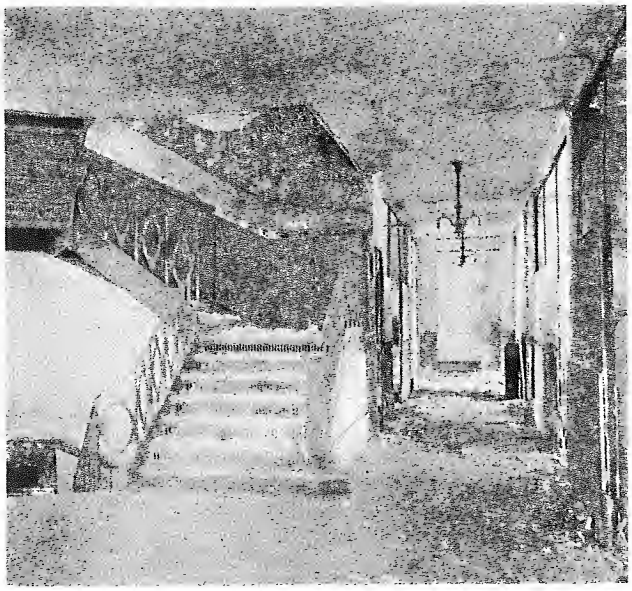


Fig. 24. Solid Metal Lath and Portland Cement Partitions Survive San Francisco Fire and Earthquake.

Fig. 25. Metal Lath and Plaster Enclosed Toilet Tower Resists Pocasset Mills Fire.

CHAPTER V

Comparative Fire Retardant Properties of Various Partitions

Digest and Recommendations:

(a) Adequate Fire Barriers Most Important for Safety To Life

From the standpoint of safety to life, the property or ability of a partition, when subjected to fire, to retain its safeguarding position as a fire barrier and, under all circumstances, permit the safe egress of occupants of dwellings, of schools, hospitals, public and commercial buildings is far more important than the fact that it may be incombustible, or the mere ability of the materials of which it is composed, to withstand the passage of heat.

(b) Tests in Actual Fires Prove Value of Metal Lath Partitions as Fire Barriers

The exceptional stability, as fire barriers, of Metal Lath reinforced solid gypsum or portland cement plaster partitions commends them for use not only for ordinary separations between rooms and between tenancies, but especially for protection of stairways, elevator shafts, corridor partitions and other means of exit.

(c) Mechanical Keys and Continuous Metal Reinforcement Permit Metal Lath Constructions To Expand Without Dislodging Plaster Protection

Metal Lath Partitions with gypsum plastering have that most essential property of fire resistive materials; the ability to expand or contract when exposed to extremes of temperature without danger of dislodgment or spalling. This is particularly important in fires when the application of the fire hose stream causes sudden cooling of the hot partitions.

Metal Lath, two-way-reinforced plaster construction, with more than 1,000 positive mechanical keys in every square foot holds the plaster, the real fire retardant, in place long after it would have fallen off the other bases, and it remains standing to resist the erosion of powerful fire hose streams after other constructions have failed.

(d) Modern Building Codes Stipulate Construction Requirements On a Performance Basis

Building code writing has become scientific. Partitions are required to possess specific fire endurance — 1, 1½ or 2 hours, etc., to provide resistance somewhat in excess of the probable duration of a fire at the particular part of the building in which the partition is located. Fire endurance is now determined by standard test procedure at nationally recognized laboratories such as at the National Bureau of Standards, or the Underwriters' Laboratories.

(e) Bureau Of Standards Tests Rate Solid Metal Lath and Gypsum Plaster the Fire Resistive Equivalent of Much Thicker and Heavier Partitions of Other Types; Metal Lath and Metal Stud Hollow Partitions with Wood Fibred Gypsum Plaster Pass Tests to Receive Official 2½-hour Ratings.

Ratings ranging from 2 up to 2¾ hours were accorded Solid Metal Lath Partitions 2 to 2¼-inches thick with lightly sanded and unsanded wood-fibred gypsum plasters by the Bureau of Standards.

Another series of tests developed ratings of 2 to 2½ hours for Metal Lath and Metal Stud Hollow Partitions, 5 inches thick overall, using lightly sanded

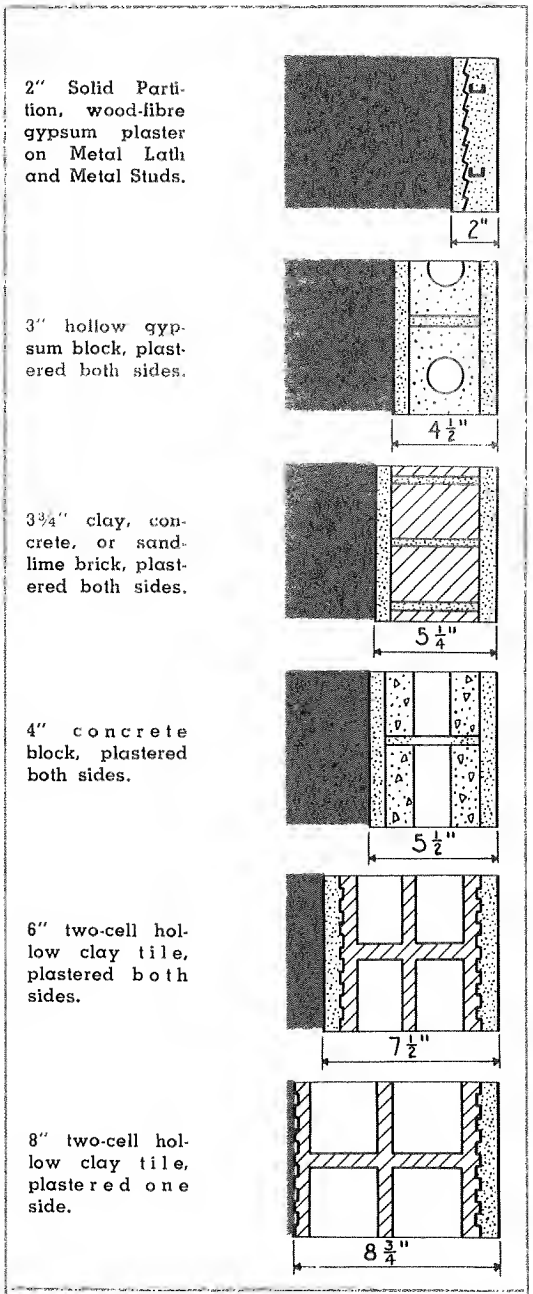


Fig. 25-A. Relative Thickness of Incombustible Partitions listed as 2-Hour Fire Retardants in "Recommended Minimum Requirements for Fire Resistance in Buildings."

(Nominal plaster thickness ¾-inch in accordance with A. S. A. specifications.)

fibred gypsum and unsanded wood fibred gypsum plasters, respectively.

Other tests resulted in ratings of from 1 to 1¼ hours for Metal Lath Solid and Hollow Partitions with regularly sanded gypsum plaster.

In March, 1939 a solid web metal stud partition, with ⅝-inch wood fibred gypsum plaster (¾ to ⅞-inch thick measured from back of lath to finished face) on ⅜-inch rib expanded Metal Lath on either side, received a 2½-hour official rating as a bearing partition.

(f) 1 and 2-Hour Ratings Accorded Wood Stud and Metal Lath Partitions with Sanded and Wood-Fibred Gypsum Plastering, Respectively

Tests at both the Underwriters' Laboratories and Bureau of Standards resulted in official ratings of 1-hour for wood stud bearing partitions protected on each side with regular sanded gypsum plaster on expanded Metal Lath.

The highest rating ever accorded combustible construction was the 2-hour rating given to wood stud non-bearing partitions plastered each side with 1-inch of wood-fibred gypsum on expanded Metal Lath. The next highest rating was 1½ hours on a wood stud bearing partition with sanded gypsum plaster on Metal Lath with stud spaces filled with mineral wool.

(g) Metal Lath and Plaster Partitions Now Specially Recognized by Building Codes

Because of the authoritative fire tests cited and excellent performance under service conditions, Metal Lath and Plaster Partitions are given special recognition in building codes throughout the United States.

1. Fire Retardant Partitions Safeguard Life and Property

Fire resistive partitions are recognized by fire departments and fire prevention authorities as an important link in the chain of barriers necessary to prevent the spread of fire within a structure in which it has started, and to provide safe egress for the occupants of the structure. Their absence permits propagation of fire horizontally and without check throughout the floor on which it starts; lack of partitions around the stairways and elevator shafts permits fire to spread vertically and in turn laterally to completely penetrate the whole structure and prevent the escape of the occupants.

To cite just one striking example of the latter there is the case of the great Baltimore conflagration of 1904. In reporting on the causes of this fire, an eminent authority stated that:

"Had the stair and elevator openings in the building where the fire originated been properly protected, there is every reason to believe that the fire department would have been able to control the fire from the start."

2. Modern Building Codes Require Fire-Resistive Partitions for Fire Control

Profiting by fire experience in buildings erected before the present day principles of fire prevention had become well established, framers of modern building codes now require fire resistive partitions to be built into the structures so as to safeguard life and confine the fire to an area whose size is largely governed by type of occupancy, and within which it can be readily brought under control by the fire department.

Fire insurance companies in determining the premium rate for building and for contents allow credits or place penalties, respectively, for the use or lack of such partitions.

3. The American Standard Time-Temperature Fire Test

After many years of experiment this test was devised by fire-prevention engineers and adopted by the American Society for Testing Materials in 1933, as a scientific means by which the fire retarding properties of various types of building construction and materials could be classified. It is now recognized as a national standard by the American Standards Association. By this test, it is possible to determine whether the materials or construction provide the protection or fire retardance required of them by building code regulations.

For partitions this test requires submission of panels, with area not less than 100 square-feet and certain minimum dimensions, to two tests: The one a fire test, and the other a fire and water test. The temperature of the standard fire increases according to time. It rises abruptly from room temperature to 1000°F. in 5 minutes, and increases gradually from there on to 1550°F. at 30 minutes; 1700°F. at 1-hour; 1850°F. at 2 hours, etc.

The first panel is subjected to the fire test for the desired endurance period, 1-hour, 2 hours, etc. The second panel of identical construction is subjected to a fire test for one-half the duration of the test on the first panel, after which the panel is exposed to the direct application of a standard hose stream.

To pass this test successfully the following conditions must be met: *(a)* The partition shall have withstood the hose stream test. *(b)* Resistance to transmission of heat through the partition shall be such that the average temperature on the unexposed side (the one away from the fire) shall not exceed 250 degrees above its initial temperature nor shall any one point exceed this average by more than 30%. *(c)* No flame shall have passed through the partition during the prescribed period. *(d)* The partition shall not have warped, bulged or disintegrated, under the action of fire or water to such an extent as to be unsafe.

4. Metal Lath and Metal Stud Solid and Hollow Partitions Receive Official Test Ratings up to 2¾ Hours. Function as 4-Hour Fire Barriers

Following tests made in 1929 at the National Bureau of Standards as a result of which the 1-hour rating was accorded to 2-Inch Solid Metal Lath and sanded gypsum plaster partitions, and a slightly higher rating to 4½-inch Hollow Metal Stud and Lath partitions, it was determined to ascertain if wood-fibred gypsum plasters and others with small proportions of sand would develop substantially greater fire endurance ratings for the Metal Lath Partitions, and also to determine their resistance as fire barriers.

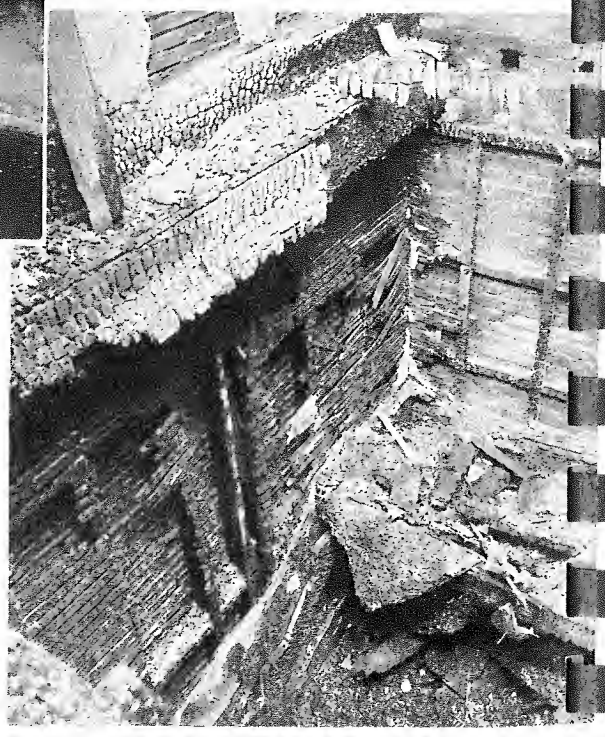
The necessary tests were completed in March, 1938, in official laboratories of the Bureau at Washington, D. C., with the following results:

2-Inch Solid Partitions of Metal Lath and ¾-inch Channel Studs, plastered with unsanded wood-fibred or sisal-fibred gypsum not only met all requirements regarding resistance to heat and flame passage of the American Standard Time-Temperature Fire Tests for a full 2-hour fire rating, and passed the severe requirements of the Fire and Hose Stream Test for the 2-hour fire rating, but also maintained their effectiveness as fire barriers for FOUR HOURS *without failure. Solid Partitions 2¼-inches thick of the same construction received a 2¾-hour official rating, while 2¼-inch partitions of 1-part gypsum to ½-part sand received a 2-hour rating.*

The performance of these partitions under extreme conditions was truly marvelous. At the end of the test, the furnace temperature had reached 2,000 degrees Fahrenheit — sufficient to melt wire glass and to fuse certain kinds of masonry — yet the Metal Lath and Plaster Partitions stood up!

Fig. 26. In the Julia Lathrop Housing, Chicago, Fire-Safe Metal Lath and Plaster Partitions Confined Damage to One Suite. Contrast this with:—

Fig. 27. **The Shambles of Another Apartment Fire Six Weeks Earlier in the same city where Combustible Lathed Partitions Burned Through Quickly with Loss of Seven Lives.**



In another series of tests, Hollow Metal Lath and Metal Stud Partitions of 5-inch overall thickness, with 1-inch of plaster of 1-part gypsum to ½-part sand on the Metal Lath faces received a full 2¼-hour rating; with unsanded wood-fibred gypsum a 2½-hour rating (non-bearing).

In March, 1939, deformed solid web steel studs with ⅝-inch wood-fibred gypsum plaster on ⅜-inch rib Metal Lath on each face, and used as bearing partitions, passed all the requirements for the 2½-hour standard fire tests for bearing partitions at official laboratories. (The plaster thickness averaged ¾-inch plus, measured from finished face to back side of the lath mesh.)

These recent tests confirm preliminary tests made some eight or ten years ago, on the basis of which two-hour ratings were recommended for various types of fireproof partitions. These are published in the report of the Building Code Committee, Department of Commerce, and entitled "RECOMMENDED MINIMUM REQUIREMENTS FOR FIRE RESISTANCE IN BUILDINGS." *(See Figure 25-A.)*

5. Ratings of Regular Sanded Gypsum Plaster Solid and Hollow Metal Lath Partitions

As reported in the preceding Article 4, the United States Bureau of Standards conducted a series of tests under the direction of S. H. Ingberg, on Metal Lath and Channel Stud, Solid and Hollow Plaster Partitions, October, 1929, with the following results:

The 1:2 sanded gypsum plaster 2-inch Solid Metal Lath Partition was given the full 1-hour rating, the 1:2½ Partition 2½ inches thick was rated 1-hour, 10 minutes; while the 4½-Inch Hollow Metal Stud and Metal Lath Partition was given a 1¼-hour rating.

This rating of 1-hour for a 2-Inch Solid Metal Lath and Plaster Partition places them on a par with thicker partitions of masonry block, brick, etc., in accordance with the fire retardance classification of the "RECOMMENDED MINIMUM REQUIREMENTS FOR FIRE RESISTANCE IN BUILDINGS" previously referred to. This table shows the following minimum permissible thicknesses for a 1-hour rating:

3 inches for unplastered hollow gypsum or cinder block, or solid reinforced concrete, or solid plasterboard and plaster.

4 inches for unplastered clay or concrete brick; or hollow concrete block.

4 inches, plus plastering both sides, for hollow clay tile.

6 inches for 2-cell unplastered clay tile.

6. Conflagrations and Other Severe Fires Prove Remarkable Fire Resistance of Metal Lath Partitions

Not only under laboratory conditions, but in the strenuous test of exposure in all sorts of fires, have Metal Lath Partitions demonstrated their remarkable endurance. Examples without number can be cited in which Metal Lath Partitions have been commended by fire chiefs, insurance men and fire prevention authorities for having confined fires to the place of origin, for maintaining stairways and elevator shafts as safe havens of refuge and exit for occupants of buildings, and of having prevented the fires from becoming holocausts.

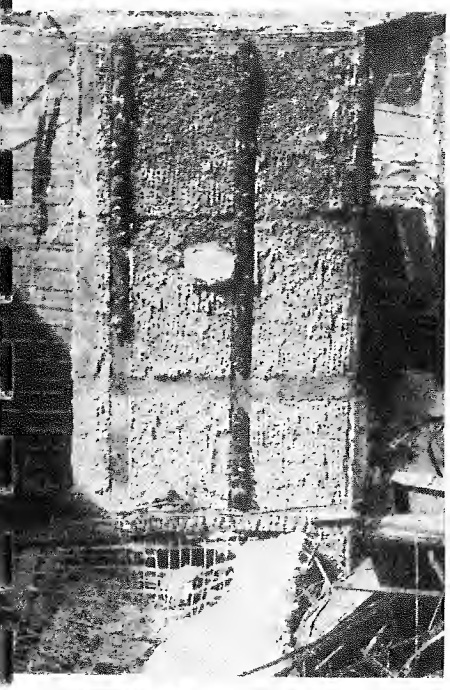


Fig. 28. In Windsor Apartments Fire, Protective Plaster was Held Intact by Metal Lath; Failure occurred on Two Other Types of Plaster Base.

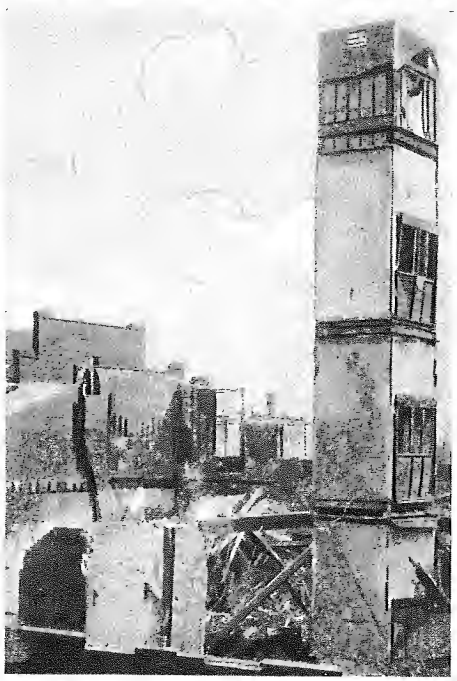


Fig. 29. At Boston, Metal Lath and Plaster Elevator Shaft Remained Standing Amid Ruins of All Other Construction.

Fig. 30. Fire Fighters Found Protection in this New York Stairshaft which was Enclosed in Metal Lath and Plaster.

1939—Julia C. Lathrop Housing, Chicago

Only about 2 years after the completion of this large federal housing project a fire broke out. Although it was of sufficient intensity to warp metal trim, shatter windows, etc., it did not penetrate through the 2-Inch Metal Lath Partitions and it was necessary for passing policemen to awaken the three sleeping occupants of the apartment and summon the fire department to extinguish the fire. Only a few hundred dollars of smoke damage occurred to the apartment. In contrast, a similar fire in a building with combustible lath which occurred only a few weeks previously in the same city, cost the lives of seven occupants and practically destroyed the entire building. *(See Figures 26 and 27.)*

1938—Windsor Apartments, Great Neck, N. Y.

A modern, recently completed 6-story apartment house of ordinary construction (not yet fully occupied) experienced a spectacular top floor fire which attacked the back side of plastering on large mesh paper-backed metal fabric in one instance, and the back side of a combustible insulating plaster base in another. Plaster fell from large areas, in each case, and permitted the fire to communicate through both floors and partition construction. This forced evacuation of the tenants, with large property damage and huge income loss. In marked contrast, the expanded Metal Lath which was used around the bathrooms held the plaster there in place. *(Figure 28.)* The marked superiority of expanded Metal Lath was recognized by the owners who used Metal Lath throughout in repairing the fire damage.

The foregoing are typical of many similar situations in recent years in which Metal Lath Partitions have justified their use a thousand-fold. Of other fires, some of them great conflagrations extending back over thirty-odd years, in which Metal Lath Partitions have functioned almost unbelievably well, while other forms of construction were destroyed, we repeat the following records from the previous edition of the PARTITION HANDBOOK:

1928—Pocasset Mills, Fall River, Mass.

A metal lath, steel stud and portland cement plaster toilet tower stood in the heart of this devastating fire, and remained standing alone and uninjured in the midst of ruins of masonry and unprotected steel and wood, another practical test and proof of fire retardance of Metal Lath and Plaster Partitions. *(See Figure 25.)*

1926—Hilton Hotel, Dallas

Everything in the hotel room was destroyed, steel window sash badly twisted, electric wiring burned 6 feet back in conduit, bath tub and wash basin badly cracked. Fire extinguishers and chemical apparatus did not make an impression on the fire, but Solid Metal Lath and Plaster Partitions, of which all rooms are constructed, confined fire to the original room—and a new finish coat of plaster after the fire, put the walls back into shape.

1924—Western Shade Cloth Co., Chicago

Explosion and fire of a nitro-cellulose compound, put the sprinkler system out of commission, pushed out the exterior walls of the building; but the Metal Lath Partitions forming the other walls of the room withstood the explosion and the great intensity of fire, and the fire department found the fire confined to the room where it originated.

1920—Glenwood Hotel, Portland, Ore.

Sixty-seven lives were saved by the use of Metal Lath protection around the elevator shaft, no one was injured and the fire loss was kept to a minimum in contrast to a similar fire occurring only 4 days previously in another hotel in the same city, and in which an unprotected stairway and elevator shaft took a toll of six lives.

1916—Straw Hat Mfg. Co., New York City

A Metal Lath stairway enclosure stood intact and provided protection for the firemen fighting a most stubborn and intensely hot factory fire after it had made such headway that it could not be effectively attacked from any other vantage point. *(See Figure 30.)*

1914—Bacon Dept. Store, Boston

This elevator shaft of 2-Inch Solid Metal Lath and Plaster located nearly in the center of the building was subjected to intense heat for many hours, as well as severe strain and shock of falling doors and masonry. Through this severe test it came out practically unscathed, except for superficial damage and warping of metal doors, destruction of wire glass in them, and stood out in bold relief as a monument among the wreckage of masonry and timber construction. *(See Figure 29.)*

1912—Colonnade Bldg., Toledo

Although fire completely burned away the supporting floor construction 2-Inch Metal Lath Partitions stood intact bridging the distance from wall to wall.

1906—San Francisco Conflagration

In contrast with the almost total destruction of masonry partitions in many fireproof buildings, Metal Lath Partitions remained standing in most cases. *(See Figure 24.)* The following are excerpts from reports by technical investigators:

J. D. Galloway, Mem. Am. Soc. C. E., is quoted in ENGINEERING NEWS (Vol. 55, No. 19, pp. 525):

> "In the Mills Building — almost all partitions failed, the ones of solid plaster standing up best. The terra cotta partitions must be taken down, but wire lath and stud partitions can be replastered."

Charles A. Hyde, Mem. Am. Soc. C. E., reports in ENGINEERING RECORD (Vol. 53, No. 24, pp. 73):

> "Interior Walls and Partitions. Where steel frames or reinforced concrete interiors are provided, there does not appear to be a safer or more satisfactory protection than that involving the use of heavy metal lath, firmly secured to small channels or I-beams, which in turn are firmly anchored to floors and ceilings. The covering of his lathing with a thick layer of the best portland cement mortar would appear to furnish a protection as satisfactory in the case of fire as that secured with the use of any other material on the market . . . "

1904—Baltimore Fire

2-Inch Metal Lath Partitions passed successfully through fire at 2700°F. that fused malleable iron and destroyed even wood sleepers embedded in cinder concrete and terra cotta floor construction. These partitions were repaired where door bucks were destroyed, and are still in use.

As stated in the report of A. L. A. Himmelright, Structural Engineer:

> "The fire damage to the Alexander Brown Building was mainly in the southwest corner, where two rooms were burned out, which contained a considerable quantity of shelves. These rooms were enclosed by wire lath and plaster partitions which stood up well. The fire in this locality burned for about 12 hours."

7. Specific Building Code Recognition of Metal Lath Partitions in Hundreds of Cities; Government Approval

Examination of objects exposed to heat in actual fires and the amount of combustible contents shows that a fire corresponding in intensity with that of the 1-hour Standard Fire Test is about as severe as can occur within the average room in office, apartment, hotel, hospital and similar occupancies; and codes are now requiring only 1-hour endurance for interior subdividing partitions in such buildings. 2-Inch Solid Metal Lath and Plaster Partitions are recognized and permitted for the enclosure of stairhalls, corridors and public halls and elevator shafts and for division partitions in fireproof buildings by the codes of the following cities among many others:

Pacific Coast Uniform Building Code adopted by 262 cities (1940), and New Orleans, La., San Francisco, Calif., Erie, Pa., Flint, Mich., Kansas City, Mo., Hartford, Conn., Detroit, Mich., Des Moines, Iowa, Denver, Colo., Indianapolis, Ind., New York City, N. Y., Los Angeles, Calif., Chicago, Ill.

In addition, many of these codes, including the Pacific Coast Code, sanction the use of Solid Metal Lath Partitions around stairways. Minneapolis, Philadelphia, Atlanta, Louisville, the Indiana State Code and the Building Code of the National Board of Fire Underwriters as well as upwards of one hundred other codes authorize the use of 2-Inch Solid Metal Lath and Plaster Partitions for general subdivision and enclosure purposes. Where 2-hour rated partitions are required, constructions with lightly sanded or wood fibred gypsum plaster will qualify. The latter has been approved and recommended to 262 cities, operating under provisions of the Pacific Coast Code, by its Research Department.

Many of these codes specifically permit Solid Metal Lath Partitions for similar uses in non-fireproof buildings.

In orders issued by the Engineering Division of the Public Works Administration (1938) official government recognition was given to the 2-hour ratings of Solid and Hollow Metal Lath Partitions. *(See Art. 4.)*

8. 1-Hour Rating for Metal Lath and Sanded Gypsum Plaster Protected Wood Stud Bearing Partitions and Wood Joisted Floors

Space permits only brief mention of the 1-hour rating granted in 1922 by the Underwriters' Laboratories of Chicago to wood stud partitions when protected each side by ¾-inch of sanded gypsum plaster applied on Expanded Metal Lath. This rating applies to both bearing and non-bearing partitions and is the highest rating accorded by the Underwriters' for any combination of wood studs and plaster protection. More recently this rating has been confirmed in tests at the National Bureau of Standards. This construction is required by hundreds of building codes throughout the country as a protection in many types of non-fireproof buildings. It is a very economical form of bearing partition considering the great ease with which it can be repaired for alterations and its framing adaptability for floors and roofs. It presents no special construction problems and is recommended as an ideal combination for use with non-bearing Solid or Hollow Metal Lath Partitions. For low-cost construction, both are recommended for use with wood joisted floors which, when protected by Expanded Metal Lath and gypsum plaster ceilings, have also received the Underwriters' 1-hour rating. This was verified by tests at official laboratories in 1939.

9. 1½-Hour Rating for Metal Lath and Sanded Gypsum Plaster Protected Wood Stud Bearing Partitions with Mineral Wool Fill

In tests completed at the Bureau of Standards in the fall of 1938 it was found that a mineral wool fill packed into the hollow spaces of wood stud partitions surfaced with Metal Lath and sanded gypsum plaster, added about ½-hour to the normal endurance without fill. The official rating of 1½-hours accorded after both fire and water tests was the highest given to any type of wood stud partition with such a fill; and was, in fact, 50% higher than accorded any other wool-filled type of wood stud bearing partition.

10. 2-Hour Rating for Metal Lath and Wood Fibred Gypsum Plaster Protected Wood Stud Non-Bearing Partitions

Undoubtedly the highest rating accorded to a non-bearing combustible partition was that received after tests at the National Bureau of Standards in 1938. Wood stud non-bearing partitions protected with Metal Lath and 1-inch wood fibred gypsum plaster received a 2-hour rating. Their use is indicated where the many advantages of protected lumber construction is desirable.

11. Metal Lath Reinforcement Insures Heat Endurance of Plaster Protection

The choice of fire test temperatures in the standard fire tests are admittedly empirical, although based on temperature which would theoretically be developed in an *"average"* fire. Because of this fact and the establishment of end points based primarily on temperature conductance rather than stability, certain constructions such as portland cement plastering on Metal Lath, long known for rugged durability and fire resistance, have not developed an extremely high technical fire resistive classification under the standard tests. But they do provide superior resistance as fire barriers and are recommended for places where rugged endurance is required. Gypsum plaster, on the other hand, is singularly adapted to resist the penetration of heat, and even thin sections when reinforced with Metal Lath furnish astounding resistance to destructive temperatures. This is particularly useful where property damage is the chief concern, such as in the prevention of ignition or exposure to damaging temperatures of goods stored on the opposite side of partitions.

12. Assured Durability of Fire Barrier Protection, as Provided by Metal Lath and Channel Reinforced Construction, of Greatest Importance

Despite the desirability of high ratings as heat-insulators, so often over-stressed in building code requirements, survival under stress of fire, so as to insure safety and protection to life, is the most important function of partitions.

VI Sound Insulation
VII Crack Resistance
VIII Sanitation
IX Dead Loads
X Hollow Partitions
XI Double Partitions

FIRE RETARDANCE

Many failures due to breaking up and disintegration, particularly when fire is combined with other factors such as impact, earthquake, fire hose streams, etc., were noted in the case of other types of partitions in the San Francisco fire and in the Burlington Office Building fire in Chicago, and other fires. Lack of reinforcement in such partitions caused rapid spread of fire from room to room in the conflagration at the Pocasset Mills, 1938. In contrast, in the great fire in Japan in 1923 and in many fires in this country, (see *Figures 24, 25, 26, 27, 28, 29, 30, 31*) Metal Lath partitions remained intact with negligible damage to their fire-retardant properties.

Undoubtedly the greater effectiveness of construction protected by Metal Lath and plaster results from the effective gripping of the plaster to the Metal Lath with thousands of *mechanical keys*, plus the further advantage that the metal and plaster possess much the same coefficient of expansion. These together help the protective covering to remain intact when exposed to high temperatures. Because of this combination, Metal Lath and Channel Iron Partitions prove so enduring. Structural members are similarly guarded by the reinforced plaster protective covering against the direct effects of heat. The penetration of heat is retarded and their yield points and strength are sustained, thus enabling them to carry their loads safely for a much longer period under fire, than if covered by less protective materials.. *See also* CHAPTER XXIII.

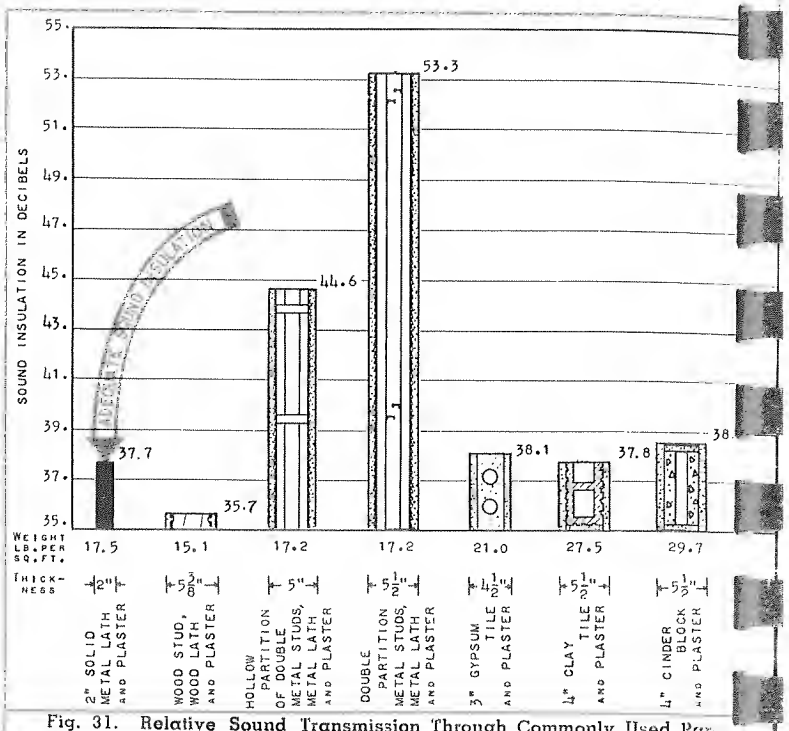


Fig. 31. Relative Sound Transmission Through Commonly Used Partitions (Based on Gypsum Plastering.)

TABLE VI—Fire Resistance Ratings of Metal Lath Partitions

No.	Type of Construction	Studs	Plaster Thickness	Total Thickness of Partition	Kind of Plaster	Rating (Hours)
1	Hollow	Wood (2" x4")	¾"*	5⅛"	Sanded 1:2, 1:3	1 hr. C (bearing)
2	Hollow	Wood (2" x 4")	¾"*	5⅛"	Sanded 1:2 (mineral wool fill)	1½ hr. C (bearing)
3	Hollow	Wood (2" x 4")	1"*	5⅝"	Wood fibred gypsum	2 hr. C (non-bearing)
4	Solid	Metal (¾" chan.)	2"	2"	Sanded 1:2, 1:2	1 hr.
5	Solid	Metal (¾" chan.)	2"	2"	Scratch coat Portland Cement, others, gypsum, 1:2	1 hr.
6	Solid	Metal (¾" chan.)	2½"	2½"	Sanded 1:2½, 1:2½	1⅙ hr.
7	Solid	Metal (¾" chan.)	2¼"	2¼"	Sanded 1:½, 1:½	2 hrs.
8	Solid	Metal (¾" chan.)	2"	2"	Wood Fibred Gypsum	2 hrs.
9	Solid	Metal (¾" chan.)	2¼"	2¼"	Wood Fibred Gypsum	2¾ hrs.
10	Hollow	Metal (prefabricated studs)	⅞"*	4¾"–7½"	Sanded 1:2, 1:2	1⅓ hrs.
11	Hollow	Metal (double row, ¾" chan.)**	¾"*	4½"	Sanded 1:2½, 1:2½	1¼ hrs.
12	Hollow	Metal (double row, ¾" chan.)**	1"*	5"	Sanded 1:½, 1:½	2¼ hrs.
13	Hollow	Metal (double row, ¾" chan.)**	1"*	5"	Wood Fibred Gypsum	2½ hrs.
14	Hollow	Metal (double row, ¾" chans.)**	⅞"*	4¾"	Wood Fibred Gypsum	2 hrs. ***

This data is a summary of the ratings accorded by the National Bureau of Standards after standard fire tests on various types of Metal Lath Partitions. (except Item 14 interpolated.)

LEGEND

* Each side
** With metal separators.
*** Interpolation by Author

NOTE: All plaster gypsum except No. 5 which had scratch coat of Portland cement with 2% short asbestos fibre.

Sanded 1:2 means 1 part gypsum, 2 parts sand, the first proportions indicated being for the scratch coat only; the others for the second and succeeding coats, if any. When sanding proportions are not indicated, plaster is unsanded.

C = Rating: Combustible. All other ratings are Incombustible. All ratings are for non-bearing partitions except Nos. 1 and 2 which are bearing partitions.

CHAPTER VI
Sound Insulation Properties of Partitions

Digest and Recommendations:

(a) Considering the great amount of sound conducted through and around even closed doors, and open windows, along conduit, by communicating ventilating ducts, by pipes projecting through partitions and through ceilings and floors, which cannot be changed by improvements in the insulation value of the partitions themselves, the importance of this function of the latter is frequently overemphasized. This is particularly true with respect to partitions within offices and apartments which necessarily must be provided with a greater or less number of doors and windows opening on to common passages or courts.

(b) Many of the modern types of plastered partitions, both fireproof and non-fireproof while in no sense "Soundproof" and which have insulation values of 35 to 42 decibels, provide a reasonable degree of privacy and quietness, considering that most cities have prevailing noise levels which tend appreciably to reduce the perception of other sounds.

(c) 2-Inch Solid and 4½-Inch Hollow Metal Lath Partitions are included in the above group. They have sound insulating properties which compare favorably with thicker and heavier masonry block and tile constructions finishing up to 5½ inches in thickness, and weighing up to 50% more than Metal Lath construction.

(d) However, where a higher degree of freedom from sound conduction is desirable with insulations above, say 45 decibels, as in hospitals, between adjoining apartments, in rooms used for music instruction, etc., it can be had with only slightly additional expense by using Metal Lath and Metal Stud Double Partitions shown by Bureau of Standards and Riverbank Laboratories tests to have an exceptionally high efficiency rating (up to 55 decibels reduction). Staggered Metal Stud Partitions are also recommended for this purpose. Both types are equally as insulative, and yet less costly and thinner and weigh less than double masonry block or furred masonry and other fireproof constructions used for the same purpose.

(e) For similar purposes in buildings of ordinary construction, use partitions as described in (d) preceding, or the following:

(1) Staggered wood stud construction, one row with stud faces parallel, the other row transverse to partition face, or (2) double wood studs 2 x 2 inches, respectively for bearing and non-bearing purposes, with Metal Lath and gypsum or cement plaster on the exposed faces. Either provides approximately 50 db. reduction in transmission. They are equally as insulative, yet less expensive than similar constructions having plastering on combustible insulating bases which do not provide the fire protection necessary for separations between tenancies, for corridors, etc.

(f) The test data and information on which the foregoing conclusions are based are analyzed in rather complete detail in the pages which follow and for ready reference by the architect, engineer or builder, are broken down into 15 rules devised by the author. This data comprises many pages of reports of tests, a number of which are hitherto unpublished, made by well-known physicists to determine the relationship of the practical physical properties of many commonly used types of partitions, to their resistance to the passage of sound.

(g) For reference purposes the basic principles established by authorities in denoting and measuring loudness of speech and musical sounds and of noises are also given.

1. Importance of Sound Insulation Value of Partitions Varies With Type of Occupancy

Most of the modern types of fire-resistive partitions such as 2-Inch Solid Metal Lath and Plaster provide both a reasonable degree of privacy and quietness for average conditions. The greater portion of the ordinary sounds originating within the room is prevented from leaving; the major portion of sounds originating in adjoining rooms is prevented from entering.

No ordinary improvement in insulation by partitions can offset the admittedly great amount of sound conducted through other sources such as around loose doors, through ventilator openings, conduits, pipes projecting through partitions, and through ceilings and floors.

Careful investigation will frequently show that sounds mistakenly considered as having come through the partitions actually have entered by these other sources. In many instances transmission through floors is greater than through partitions.

Therefore, it is useless to have a partition "soundproof" and leave other avenues open, permitting excessive sound conduction. The insulation of floors and ceilings is expensive and justified only for exceptional cases such as music and broadcasting studios, school rooms, etc. It is now generally recognized that sound-proofing as a function of ordinary dividing partitions within the average occupancy unit has been unduly emphasized.

Where, however, it is desirable to insulate different units or occupancies more effectively from one another, as between tenancies in an apartment building, consideration should be given to methods and materials which will bring this about; but to accomplish this it is not only essential to employ a different and more insulative type of partition than is commonly used for separation within the occupancy unit, but the various channels described above, which permit sound transmission, should also be blocked.

2. Basic Laws of Sound Insulation Established by Scientific Tests

Attempts to compare sound insulation of partitions under widely different conditions of use and occupancy, and without scientific apparatus, are common. Conditions of use, however, have such great effect upon actual audibility of sounds that unless proper allowance is made for them, results are without value for comparison purposes.

Determinations of the relative insulation properties of materials are now made in specially built sound-testing chambers in scientific laboratories, and at present this is the basis on which accurate comparisons are usually made.

VI Sound Insulation
VII Crack Resistance
VIII Sanitation
IX Dead Loads
X Hollow Partitions
XI Double Partitions

3. Characteristics of Sound: How Intensity is Measured

(a) Loudness and Frequency of Vibration

Sounds of speech, musical tones and noises have the two characteristics most important in sound transmission, namely *loudness* and *pitch* (or frequency of vibration).

Loudness depends on the sensation as registered in the ear canal. The lowest point in which the sound energy becomes audible to the human ear is called the "Threshold of Audibility". The upper level of maximum distinguishable intensity is called the "Threshold of Feeling".

(b) Decibel: The Intensity Measuring Unit

The "decibel" is a measuring unit by which to establish the difference in intensity of sounds.

As stated by Chrisler:

"Experiment shows that the response of the ear is approximately proportional to the logarithm of the sound energy; that is, energies proportional to 10,100 and 1000 would produce in the ear effects proportional to 1, 2 and 3 respectively.

A slight modification of this logarithmic scale has come into general use to measure sound energy and the amount of noise reduction. It is called the decibel scale. This scale merely multiplies the numbers of the logarithm scale by 10."

Essentially then, a decibel, (db.) *corresponds to a fractional change in energy of sound, which is approximately the smallest that the average ear can detect. It is, practically, the difference in intensity between two sounds, one of which to the ear is just perceptibly louder than the other.* Although this relationship does not hold strictly for all frequencies of vibration, it is close enough for all practical purposes and will therefore be used throughout this discussion.

It should be noted, in passing, that the use of the decibel scale in comparing sound energy differences is not unlike the degree scale used in comparing temperature differences. In the latter case we do not correctly say that the weather at 80 degrees is twice as warm as at 40 degrees; we say it is 40 degrees warmer. Similarly a sound with 80 decibel energy is not twice as loud as one with 40 decibel energy; it is merely 40 decibels louder.

(c) Great Range in, and Effect of Frequency of Vibration

Tests have shown that the frequency of vibration of a sound has an important bearing on the success with which a partition will resist its transmission. Speech sound and the singing voice involve frequencies ranging from 128 to over 5000 vibrations per second. Greatest energy in speech sounds, and consequently those which produce the greatest vibration and have the greatest tendency to be transmitted, are those below a frequency of 1000.

(d) Important Effect of Distance from Source, on Apparent Intensity of Sound

A fundamental fact is that the intensity of sound varies inversely as the square of the distance from the source.

(e) Loudness of Speech, Music, Noise

Note especially the great variation in loudness of speech in the following table compiled from various authorities:

TABLE VII—Loudness of Various Sounds Measured in Soundproof Room with Ear 4 Feet from Source

Source or Kind of Sound	Intensity Above Threshold of Audibility
Very Loud Conversational Voice	70 decibels
Average Conversational Voice	60 "
Soft Conversational Voice	40 "
Singing Voice	75–95 "
Radio (loud)	80 "
Radio (soft)	40 "
Telephone Bell	70–80 "

(f) Effect of Absorption in Room of Origin

Besides dispersing some of its intensity as it proceeds in all directions from its original source, the net intensity of the sound is also reduced by the absorption of surrounding objects which, by converting some of the sound waves into heat, reduce the energy or intensity of the sound. In most types of occupancy, materials used on floors and walls and in some cases on ceilings, such as rugs, drapes, upholstered furniture, etc., being of an absorptive nature, function in the manner indicated. Thus the amount of sound which finally impacts itself on a partition is reduced by the amount absorbed by the objects encountered before reaching it and it may be further reduced by absorptive materials used on the partition itself.

(g) Effect of Noise on Hearing

Noise produces a loss in the sensitivity or perception of the ear which is identical with equivalent deafness. Because of this masking effect the apparent loudness of sound thus registered in the ear is further reduced by whatever happens to be the loudness of the noises or other sounds—that is the prevailing sound level—in the immediate vicinity of the listener. The effect of noise on the ear is such that sounds of sufficient intensity to be easily heard in a quiet place are "drowned" on a noisy downtown corner. Loudness levels are shown at the right side of *Figure 35, Page 39;* and values for typical locations and noises are given in TABLE VIII, *Page 37.*

TABLE VIII—Loss of Perception of Sound, or Deafening Effect of Noise*

Scale of Sound Intensities	Typical Place for and Kind of Noise
100 db.	Automobile horn at distance of 23 feet
90	New York Subway express train
80	Elevated train as heard on street
70	Stenographic room
60	Noisy office or department store
50	Moderate restaurant clatter Average office
40	Quiet office
30	Average residence
20	Quiet private office Quietest residence measured
10	Country residence
0	Soundproof booth *(Threshold of Audibility)*

*Adapted from "City Noise", Department of Health, New York City, etc.

(h) Variations in Ear Sensitivity of the Same Person or of Conditions of Use, or Position of Listener, or in Noise Level, May Vary Apparent Loudness of Sounds of Identical Intensity by 5 to 10 Decibels.

Tests by Rogers H. Galt of the Bell Telephone Laboratories on the effect of noise on the acuteness of hearing led him to conclude:

". . . the noise level itself is rarely a constant quantity, but in the case of room noises usually changes with time over a range of ten decibels or more, and in many instances varies by such an amount with position in the room. Secondly, auditory and psychological differences between different observers having normal hearing, or between the responses of the same observer at different times, may introduce variations as great as five to ten decibels.

"A single observation by one observer will generally indicate the magnitude of the deafening effect of a constant noise to within five or ten decibels of the mean of several observers using different measuring sets."

This variation in sensitivity of 5 to 10 decibels in the average ear bears an important part in the discussion which follows.

(i) SUMMARY: How to Compute Net Intensity of Sound After Passing from One Room to Another

From *Paragraph d* the loss in intensity due to the distance between the ear and sound source, is assumed at 40 db. The net remaining, or apparent intensity will be termed "*original intensity.*" This is further reduced *(Paragraph f)* by the absorptive value of the room itself. Then, in order to determine the *net intensity* after the sound passes through a partition into an adjoining room and considering the absorption in both rooms and the noise level in the second or listener's room, it is established that:

The net audibility in the listener's room of a sound originating in an adjoining room is equal to its original intensity minus the loss due to absorption in the room of origin, minus the insulating value of the dividing partition, minus the loss due to absorption in the listener's room, and minus the masking effect of extraneous sound in the listener's room.

4. Source of Data:

As a result of tests by Dr. Paul E. Sabine at the Riverbank Laboratories, Geneva, Ill., by Chrisler and Snyder at the National Bureau of Standards, by Professor F. E. Watson and Wallace Waterfall at the University of Illinois, by Professor V. O. Knudsen at the University of California, and by scientific investigation in foreign countries, a wealth of information on sound insulation has been published. This, together with hitherto unpublished data on tests made for the Metal Lath Manufacturers Association, constitutes a background of information on which are based the conclusions and rules which follow.

5. Distinction Between Acoustical Treatment for Absorption of Sound—and Sound Insulation

Methods of design and materials used in finishing the interiors of large rooms or auditoriums to perfect the audition of music, speech, etc.; and methods used to create quietness in rooms by means of materials employed for the *absorption of noise and other sounds* (such as of clattering dishes, typewriters or other office machines, etc.), are almost entirely unrelated to the construction methods, design and materials necessary in walls, floors and partitions to prevent *transmission of sounds* to adjoining parts of the building. Acoustical absorption materials introduced into a room have no important bearing on the sound-insulation functioning of partitions, and their maximum effect in lowering the noise level in a room is within the range of 5 to 7 db. A much greater improvement in reduc-

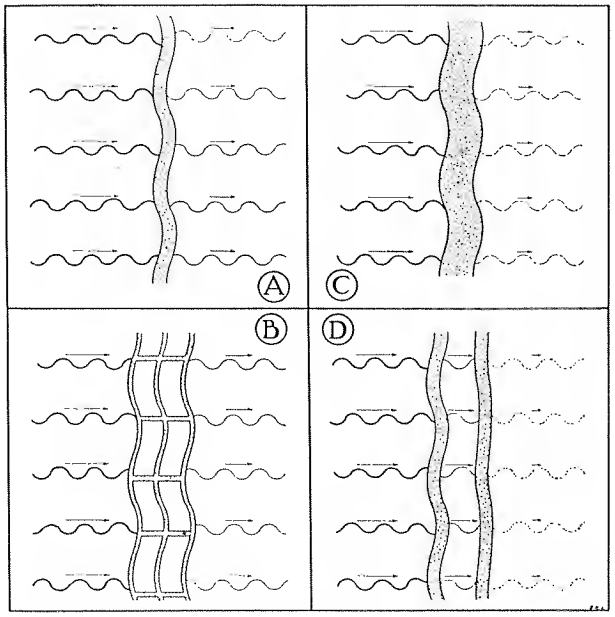


Fig. 33. Comparison of Effect, and Reduction in Intensity, of Air-Borne Sound After Striking: (A) Single Thin Solid Partition, (B) Single Masonry Block Partition, (C) Single Heavy Solid Masonry or Plaster Partition, (D) Double Partition.

Vibrations of Partitions Shown Greatly Magnified

ing sound conduction between rooms can be attained by suitable choice of partitions.

6. Fifteen Rules Showing Relationship Between Physical Properties of Partitions and Their Resistance to the Passage of Sound

Rule 1

Weight Is Most Important Factor in Determining Sound Insulation Value of Solid or Bridged-over Partitions.

Sound insulating properties of the usual masonry block or solid or hollow plaster partition are quite closely related to its weight. Thus, when sound waves set the partition in vibration, the partition in turn sets up sound waves in the air adjoining it, which then proceed to the ear of the listener on the other side. *(Figure 33, Diagram A, Page 37)* Since the partition's resistance to vibration is found to be related to the mass or weight, the greater the weight, other things being equal, the less the vibration and the less sound transmitted.

This rule applies quite generally to commonly used partitions such as Solid Metal Lath and Plaster, solid brick, and clay, gypsum or cinder concrete hollow-block partitions, and even to some types of wood-stud partitions, but there are exceptions among types not ordinarily used and the rule does not apply to composite or furred-out constructions or double partitions. The relationship between weight and sound insulation values is illustrated by the curve in *Figure 34.*

This general rule was first suggested, after a comprehensive series of tests, by Dr. Paul E. Sabine of Riverbank Laboratories.

From this diagram it is apparent that knowing the weight per square foot of partition, if it be of the general solid or hollow-block, masonry or plaster types, that its resistance to sound transmission can be closely estimated.

Rule 2

Appreciable Increases in Weight of Solid or Bridged-over Partitions Brings Much Smaller Relative Increases in Sound Insulation.

Examination of the curve in *Figure 34* shows *that while the average 17-pound-per-square-foot partition has a rating of about 36 db., that a partition of double the weight—34 pounds—has a rating of 42 db. or only 6 db. more.* This is a very significant point as it proves that marked improvement cannot be obtained merely by increasing the weight, unless the increased weight is prohibitive from the standpoint of structural requirements, etc.

Rule 3

Sound Insulation Values of Partitions Built of Cored-Out Masonry Units Reduced in Accordance with Weight Reduction.

It has been determined that a partition of cored-out hollow blocks, because it weighs less, transmits more sound than a partition of the same thickness of solid blocks.

Action of Sound on Cored Masonry Block Partitions: Investigators agree that the failure of the hollow spaces in such partitions to reduce transmission is due to the fact that the sound vibrations travel along the path afforded by the continuity of the webs of the block or tile which at very frequent intervals tie together the exposed faces of the partition, causing them to function, in effect, as drum heads, so that both sides of the partitions vibrate in unison. *(Figure 33, Diagram B) The enclosed air space in such construction therefore serves no use or function in reducing transmission.* Such a bridged-over partition from the sound transmission standpoint is considered as a single unit and its efficiency in stopping sound is judged on the basis of its total weight per square foot as in Rule 1.

Rule 4

The Commonly Used Fire-resistive Partitions from 2 Inches to 5½ Inches in Total Plastered Thickness and Including Solid and Hollow Metal Lath, Gypsum Block and Clay Tile Have Sound Insulation Values Differing by Less than 5 to 6 Decibels and for Average Conditions of Use Are Considered Equally Sound Insulative.

In *Paragraph 3-h, Page 37,* it is seen that the unaided ear in the presence of ordinary noise lacks sensitivity to distinguish between sounds unless they differ by more than 5 and sometimes as much as 10 decibels. Sound tests vary 2 to 10 db. on identical construction tested by a laboratory at different times.

Difference in workmanship for supposedly identical construction will result in from 3 to 7 or more decibels difference in transmission. Variations in conductivity, according to the frequency of vibration of the test sound, range from 2 to 20 db. and upward for a given partition.

These are all reasons why partitions which are shown by scientific tests to have average sound reduction factors which do not differ by more than 5 or 6 db., may be considered as possessing equivalent resistance to sound transmission.

Accordingly, a horizontal "*intensity*" band of 5 db. has been drawn as a shaded area on the curve of *Figure 34.* This is plotted from data on Bureau of Standards tests.

Sound Insulation Values of 2-Inch Solid Metal Lath Partitions Equal Masonry Block Types

Note that this figure shows all the commonly used types of incombustible partitions, ranging from the 2-Inch Solid Metal Lath Partition to considerably thicker and heavier masonry block and tile, lie within this band of 5 decibels width.

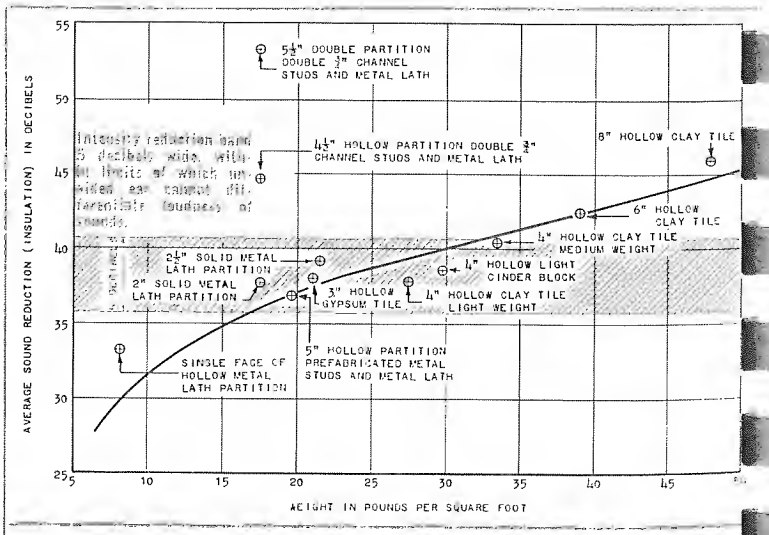


Fig. 34. Relationship Between Weight, Type, and Sound Insulation Ratings of Partitions.

Hollow partitions of the Prefabricated Stud and Metal Lath type have approximately the same insulation value as 2-Inch Solid Metal Lath Partitions.

Hollow partitions of the Double Metal Stud and Metal Lath type stand well above others of equal thickness and compare favorably with those of much greater weight.

Rule 5.

Relative Thickness Not Basis for Comparing Sound Insulation Values of Partitions of Dis-Similar or Non-Homogeneous Construction.

Adding thickness to a partition of homogeneous construction will generally increase its sound insulation merely because of its increased weight. However, sound insulation of partitions of varying types of construction and materials cannot be compared one with the other on the basis of thickness only. For instance, 2-Inch Solid Metal Lath Partitions provide sound insulation equivalent (See *Figure 31, Page 34*) to masonry constructions of more than double the thickness.

Rule 6

Relative Rigidity Not a Criterion of Sound Insulation Properties.

After an extensive series of tests, in which rigidity was measured as well as sound insulation and which showed that a large increase in stiffness produced a very small increase in sound reduction value, Dr. Sabine of Riverbank Laboratories reached the following conclusion on which this, Rule 6, is based: *"There is no obvious correspondence between stiffness and sound reduction."*

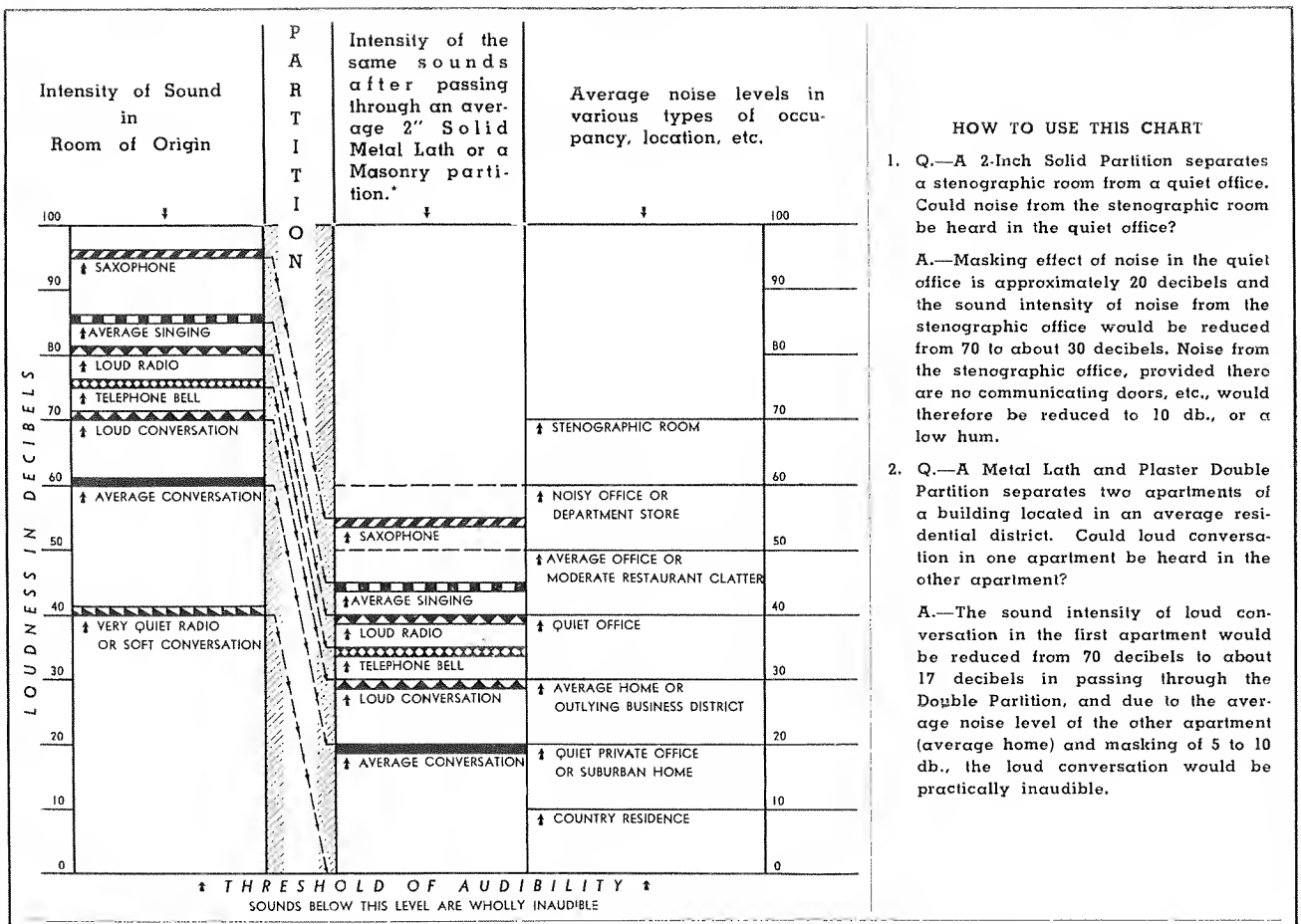
Rule 7

(A Comparative Resistance of Partitions to Transmission of Air-Borne Sounds Cannot be Determined by Tapping Sounds or Percussion. (B) Corridor Sounds, Machinery Vibrations, Telephone Bells, etc., Inducing Sound Transmission by Direct Impact or Vibration Should Be Absorbed or Insulated at Source.

Tests at the Bureau of Standards show that tapping against or striking a partition produces no true measure of the resistance of the partition to air-borne sounds; therefore since most sounds are air-borne, sound conduction tests for partitions should be made on that basis and not on tapping.

The only effective way to prevent partitions being set into vibration by floors, beams and columns which vibrate because of moving machinery, organ music, etc., is to localize the vibration at its source, i. e. at the machinery, organ, etc.

Insulation against such sounds can be accomplished effectively by placing a medium of different elasticity and density such as live rubber, sheet lead, machinery cork, hairfelt, etc., between the source of vibration and the structure. Similarly, because a much larger part of the sound effects of a ringing telephone bell attached directly to a partition will be carried through it by direct vibrational impact, than by way of the air, architects now speci-



HOW TO USE THIS CHART

1. Q.—A 2-Inch Solid Partition separates a stenographic room from a quiet office. Could noise from the stenographic room be heard in the quiet office?

   A.—Masking effect of noise in the quiet office is approximately 20 decibels and the sound intensity of noise from the stenographic office would be reduced from 70 to about 30 decibels. Noise from the stenographic office, provided there are no communicating doors, etc., would therefore be reduced to 10 db., or a low hum.

2. Q.—A Metal Lath and Plaster Double Partition separates two apartments of a building located in an average residential district. Could loud conversation in one apartment be heard in the other apartment?

   A.—The sound intensity of loud conversation in the first apartment would be reduced from 70 decibels to about 17 decibels in passing through the Double Partition, and due to the average noise level of the other apartment (average home) and masking of 5 to 10 db., the loud conversation would be practically inaudible.

* For Metal Lath Double Partitions Values are 13-15 db. lower.

Fig. 35. Loudness of Sounds After Passing Through Metal Lath or Masonry Partitions, and Their Relation to Various Conditions of Noise.

VII Crack Resistance

VIII Sanitation

IX Dead Loads

X Hollow Partitions

XI Double Partitions

fy location of such bells on non-communicating walls or partitions. In the latest equipment the bells are part of the telephone set, thus direct vibration conduction is almost entirely eliminated.

Consider also, the so-called *"transmission along the partition"* proper, of the noise of slamming doors. The noise which is heard in some distant part of the building has reached there via the air because of the echoes and reverberation down the corridor or up the stairshaft. It is, in fact a matter for acoustical correction, and stiffness of the partition is not a factor.

Here, again, common sense dictates advisability of stopping the noise at the source and the use of door checks or rubber or other resilient door stops and use of proper construction and anchorage for door bucks (*See* CHAPTER XIII). Rugs on corridor floors, or, where rugs are not desirable, acoustic absorption on ceilings also will materially correct the propagation of corridor noises.

Rule 8

Insulation Efficiencies of Partitions Vary with the Pitch or Frequency of the Sound, but an Accurate Comparison of Average Sound Insulation Values of Partitions Cannot be Made on the Basis of Only One or Two Frequencies, but Should be Made on Several, Well Distributed Over the Musical Range.

Tests confirm practical experience in comparing conversational sounds heard through various partitions; the low pitched sounds usually penetrate, the high pitched ones generally do not. However, some types of partitions resist the higher pitched sounds better than do other partitions while others are more successful with those in the middle range; most partitions experience difficulty in preventing the passage of sounds of low frequency; and there is great variation throughout the whole musical range. Therefore, no general comparison of relative sound insulation can be made on the basis of tests on but few frequencies. Results to be of value should be made with tests at wide enough intervals to encompass the major part of the musical range, *a minimum of 7 to 9 is preferable.*

Rule 9

Solid Metal Lath and Plaster Partitions Provide a Satisfactory Degree of Privacy and Quietness for Dividing Partitions Within Units of Apartments, Hotels, Offices and Schools.

As shown graphically by the downward sloping lines in *Figure 35*, the net effect of partitions which separate the listener from the room in which sounds originate is to reduce the intensity of these sounds to the ear of the listener. *In addition to this there is the further reduction produced by the effect of any noises surrounding him.*

This is readily computed by simple subtraction. Thus an average conversational sound of 60 decibels after passing through a partition of 40 decibels sound insulation value reduces to 20 decibels. How much of the remaining 20 db. sound intensity is audible or intelligible depends on the masking effects of the prevailing noise within the listener's room. (*See* TABLE IX.)

Authorities recommend for average residential occupancy, apartments, hotels and houses, a type of partition which will reduce the sound transmitted down to 10 to 20 decibels; for private offices, to 20 to 30 db., etc. Then under the average noise level conditions found in urban communities and in the average city office or apartment, with the hum of street noises, or of business machines such as typewriters — conversation and sounds of an average radio originating on the other side of a 2-Inch Solid or 4⅛-Inch Metal Lath and Metal Stud Hollow Partition with 35 to 42 db. sound insulation rating would be quite inaudible. In other cases (*See* TABLE IX), while not inaudible, such sounds would be quite unintelligible, and the partitions found entirely adequate from the privacy standpoint.

Considering that after the early evening hours, noise levels usually drop in residential communities, the masking effects drop correspondingly, permitting sounds from adjoining occupancies, which earlier in the day are screened out, to become noticeable. Under such conditions, and where financial considerations—higher rentals, etc.—permit the greater construction investment involved, partitions dividing tenancies in apartments and for hospitals, and having a higher value than 35 to 40 db. reduction, are considered desirable. Values of 45 to 50 db. and occasionally more, are recommended. Since neither 2-Inch Solid Metal Lath and Plaster nor the more commonly used masonry block or wood stud partitions attain that measure of insulation, the use of Metal or Wood, Double and Staggered Stud and Metal Lath Partitions is recommended. These having ratings of the order of 45 to 55 db. insulation. (*See* TABLE XII.)

TABLE IX—Masking Effect of Noise on Audibility of Sounds

Nature of Sound		Intensity in db. in Room of Origin	Apparent Loudness, after leaving room of origin and Passing Through Partitions with 40 db. Insulating Value, to Listeners in Rooms Where Noises Produce Masking Effects as Below:			
			0-5 db.	5-10 db.	10-15 db.	10-20 db.
			Country Residence	Quiet Office or Suburb	Ave. Residence	Ave. Office
Loud Conversation		70	25	20	15	10
Average Conversation		60	15	10	5	0
Soft Conversation		40	0	0	0	0
Average Singing		85	40	35	30	25
Phone Bell	Attached to Partition	75	70	65	60	55
	Unattached	75	30	25	20	15
Radio	Loud	80	35	30	25	20
	Soft	40	0	0	0	0

It should be remembered that the average door used in modern buildings has only from 22 to 25 db. rating so that, if the partition has such a door in it, consideration of costlier and heavier types of partitions to reduce sound transmission is obviously unwise, as the rating of the door materially reduces the "*overall*" insulating value of any partition.

Rule 10

Double Partitions in Which the Two Elements or Surfaces Are Completely Separated by Air, Resist Sound Much More Effectively than Solid Partitions of Equivalent Total Weight. Transmission Through Each of the Halves of the Partition Follows Rule No. 1, Transmission Through the Composite Construction Does Not.

The greater effectiveness of double partitions in preventing the passage of sound as compared with solid or bridged-over hollow partitions of equal weight is attributed to the double change in elasticity and density from plaster to air and again from air to plaster as the sound waves strike the second member. *(See Figure 33, Diagram D, Page 37.)* There is also some reflection back, into the hollow space, of the sound waves which reach the second member. This action contrasts with the single change in elasticity and density of the propagating medium where the partition is solid. Thus, while the weight of solid or bridged-over partitions is an index to their resistance to the passage of sound, weight bears no apparent relation to the sound resistance of partitions of double construction.

The much greater sound insulation or reduction factor for double partitions as compared with solid or "bridged-over" types of equal weight is shown in *Figure 34, Page 38* where values for a Double Metal Lath Partition appear above those for Solid Metal Lath Partitions. However, only a 2.3 db. improvement was shown with an increase, in overall thickness of the double partition, from 4½ inches to 10 inches. It would appear that considering space-occupancy the 5½-inch thickness of double partition produces optimum results. *(See* TABLE XII, *page 43.)*

Metal Lath Double Partitions Have High Sound Insulation Rating

Where a superior degree of sound insulation is desirable the Double Metal Lath Partition offers an economical solution to the problems of sound-proofing.

A double walled partition weighing, complete, only 17 to 18 pounds per square foot, with insulation values of up to 53 decibels for the 5½-inch thickness (55 db. for the 10-inch thickness) when used under conditions where noise levels are quite low will make loud conversation, singing or a noisy radio in an adjoining room, unintelligible, and, in most cases, inaudible.

Sound Insulation Values of Light, Metal Lath Double Partitions Compare Favorably with Those of Heavy Masonry Double Partitions

Tests at the Bureau of Standards gave a rating of 52.3 db. to a double clay tile partition weighing 50 pounds per square foot and constructed of 3 x 12 x 12-inch hollow partition tile with 1-inch flaxlinum in the 1¾-inch hollow space.

Dr. Sabine's tests at Riverbank Laboratories *(See* TABLE XI) which produced ratings varying from 0 up to 5 or 10 db. from those at the Bureau of Standards for generally identical constructions, corroborate the latter. Both authorities' tests demonstrate that Metal Lath Double Partitions which weigh only half as much, occupy only half as much wall thickness and cost only half as much, have sound insulative value equivalent to much heavier and thicker masonry constructions.

Rule 11

(A) So-called Sound-deadening Materials Which Completely Fill the Air Space in Double Partitions, Produce Little if Any Beneficial Results. The Unfilled Space Proves More Satisfactory: Absorptive Membranes Used in the Hollow Space Are Effective When They Do Not Touch Either Side of the Partition and When the Free Air Adjoining the Membrane is Large Enough to Permit Dissipation and Absorption of Sound Energy by the Membrane.

(B) Slag, Sand and Similar Heavy Fillings Used in Plastered Hollow Stud Partitions and Which Appreciably Increase Their Weight Give Increased Insulation.

(C) Mineral Wool, Quilting, Sawdust and Similar Light Materials Used as Fill Are of Doubtful Value.

Sabine and Chrisler demonstrated that in most cases where fillers of felt, quilt, mineral wool, cork, fibre board and similar porous materials were used in the hollow space between the two halves of a double partition, the sound insulation was not only *not improved* through asbsorption of sound by these materials, but that on the contrary many of them functioned as conductors to transmit sound across the space so that frequently more sound passed through the partition than when the air space was unfilled, and that in those cases where better results were achieved there had not been sufficient improvement to warrant the additional expense.

Tests also show that absorbent membranes frequently used in the hollow spaces of double partitions are of doubtful value when the membrane touches either side of the partition. However, with a clear separation of 2 to 3 inches either side of the membrane, it becomes effective and transmission is reduced appreciably.

In Hollow Stud Partitions, since the two faces are connected by means of and at the studs, the added bridging effect produced by the introduction of a fill does not introduce more detrimental conductivity. In fact, there is some advantage if the fill is quite heavy in proportion to the total weight of the partition, because of the damping effect of the fill on the vibration of the whole partition. On the other hand, while it has been found that the damping is proportional to the total increase in weight, it is the logarithmic ratio of the weight increase. Therefore, light weight fillers cannot be expected to produce an increase of moment, and this has proved the general rule in tests.

Rule 12

Sound Insulation Values of Plastered Metal Lath Wood Stud Partitions Are Superior to Unplastered Insulation Board Partitions, etc., and Are Approximately Equivalent to Plastered Insulation Board Partitions.

Partitions with facings of unplastered porous, composition, or fibrous materials of the type frequently used for thermal insulation, react differently to the passage of sound than those faced with impervious plaster. The latter reflect a very large part of the sound striking the partition and thus greatly reduce the amount of sound which may be transmitted. The porous materials permit the direct transmission of the sound waves through the partition by way of the pores. Thus, when the heat insulating type of fibre board is used *unplastered* in the thickness commonly employed on wood stud partitions, it has an appreciable lower sound reduction rating than when plastered *(See* TABLE X), and is considerably less effective than the commonly used plastered finishes on wood or Metal Lath.

When the insulation board facings are plastered the insulation value of the partition is increased but its sound reduction value is then in about the same range *(varying by about 5 decibels reduction)* as plastering on Metal Lath. Thus the insulation board does not have any special merit for *sound insulation* not possessed by most non-heating-insulating plaster bases.

Rule 13

(A) Staggered 2x4-Inch Wood Stud Bearing Partitions with Plastered Facings Have Considerably Greater Sound Reduction Values than Partitions with a Single Row of Wood Studs with the Same Facings.

(B) Staggered Wood Stud Partitions with Metal Lath and Plaster Facings Have Sound Reduction Values Equal to Those Faced with Plastered Fibre Insulation Board.

In a recent test at the Bureau of Standards a staggered wood stud bearing partition with the 4-inch dimension of one set of studs set at right angles to the face *(for bearing purposes)* and the alternating set of studs on the other face set flat *(for space saving)* showed an average of 49.8 db. reduction.

This is a substantial improvement over the figures (39.2 db.) obtained with a single set of studs, and is believed better than a staggered partition with the wide faces of both rows of studs set perpendicular to the face of the partition. This value for Metal Lath ranks with the Bureau's tests of staggered wood studs with plastered ½-inch fibre insulating board on each side.

Dr. Sabine found that with Metal Lath there was a marked improvement *(from 33.2 to 44.4 db.)* when the studs were staggered, but a much smaller improvement, *(from 37.0 to 41.6 db.)* for the fibre board staggered construction.

From TABLE XI it will be noted that in Dr. Sabine's tests at Riverbank Laboratories the staggered 2 x 4-inch wood studs with Metal Lath and Plaster rated 44.4 db., while with Celotex they rated 41.6 db. *The data in both instances show that the use of an insulating board plaster base shows no superiority over the uninsulated fireproof type of base when each is plastered.*

Plastered Partitions of Metal Lath on Double and Staggered Metal or Wood Studs are Fire retardant, less costly, and yet have sound insulation values equivalent to combustible double partitions faced with plastered combustible insulation boards.

Thus for separating tenancies in buildings where ordinary wood stud partitions are otherwise used within apartments, there are available:

Non-bearing: Double Metal Lath and Plaster Partitions using Channel Iron Studs, or the same construction using 2 x 2-inch Wood Studs or Staggered Prefabricated Metal Studs.

Bearing: Staggered 2 x 4-inch Wood Stud Metal Lath and Plaster Partitions, with studs on one face at right angles for bearing purposes; and flat on the other face for decreasing overall thickness.

Each of these types has important fire protection advantages necessary for subdividing partitions as required by modern building codes; and each has sound insulation properties equivalent to or better than less fire-resistive plastered or unplastered insulation boards applied to double or staggered wood studding.

TABLE X—Sound Insulation Values of 2x4-inch Wood Stud Partitions with Various Types of Plaster Bases Each Side. (Plaster where used is ½ to ⅝-inch gypsum.)

Plaster Base	Plastered?	Reduction in Decibels	
		Dr. Sabine	Bureau of Standards
½-Inch Celotex	No	26.2	....
½-Inch Celotex	Yes	37.0	....
Wood Lath	Yes	33.4	35.7
Metal Lath	Yes	33.2	39.2
Metal Lath (with granulated slag fill in hollow space of partition)	Yes	41.6	....
Metal Lath on furring strips and ½-Inch felt	Yes	45.4	....

TABLE XI—Sound Insulation Values of Double Walls Connected at the Edges*

Description	Plaster Base	Plaster Thickness**	Total Thickness	Weight lb./sq. ft.	Reduction Decibels
Hollow Metal Stud double ¾" channels on masonry	Metal Lath	¾"	4"	18.0	39.7
Double Metal Stud double ¾" channels on masonry	Metal Lath	¾"	4"	18.0	49.5
Double Metal Stud double ¾" channon wood plate	Metal Lath	¾"	4"	18.0	52.5***
Dble. 3-in. Hollow Gypsum Tile with ½" Celotex in 2-in. air space	Gypsum Tile	½"	9"	32.0	47.8
Staggered 2" x 4" wood studs, 16" o. c.	Metal Lath	½"	7½"	19.8	44.4
Same	½" Celotex	½"	7½"	13.0	41.6

* From "ACOUSTICS and ARCHITECTURE" by Dr. Paul E. Sabine, (McGraw-Hill Publishing Co.) except as noted below:
** Gypsum plaster used in each case.
*** This data, interpolated by author, and on the basis that resting partition (listed directly above) on wood would increase reduction approximately 3.0 db. more than when on masonry (as determined by Chrisler).

Rule 14

(A) The Better the Edges of the Partition Are Insulated from Floors, Walls and Ceilings Against Which They Abut, the More Effective the Partition Functions as an Insulator.

(B) Sound Insulation Value of Masonry Partitions are Greatly Improved When Furred and Plaster on Metal Lath Applied.

Tests by Chrisler of the Bureau of Standards, and others, show that best results are obtained by insulating the edges of the partition from the surrounding walls, floors and ceiling by means of felt or other shock absorbers such as cork, lead, etc. This point is important for music studios, bowling alleys, radio-broadcasting, etc., where entire freedom from conduction of sound through the floor slab or ceiling is desirable. The use of machinery cork under and over the partition along floors and ceiling is specially advantageous and recommended for important sound insulating jobs. Chrisler found that placing a double partition on machinery cork increases its insulating value 4.8 db. over that obtained when setting it directly on concrete. However, no improvement was shown for a similar change in solid partitions.

Care should be exercised in the erection of any form of sound-resistive double partitions to see that no part of it will touch piping, conduits, heat ducts, etc., which may form a similar contact with the other part of the construction and thus largely diminish the sound-proofing advantages of the air space. (*See Part II*, CHAPTER XXII.)

Chrisler found that Metal Lath and Plaster attached to and furred from a masonry partition greatly reduced sound transmission through the composite construction.

Steel clips of a resilient nature employed to separate the Metal Lath and Channel Iron furred face of a wall or partition from the remainder of the wall; and also "*isolators*" of fibre or live rubber, will absorb a large part of the sound vibrations impacting on one side of the wall so that they are conducted with greatly diminished vigor to the other side. This combination has resulted in very satisfactory installations in places where freedom from sound transmission is of paramount importance.

Rule 15

Cracks Around Door, Window and Ventilator Openings in Walls and Partitions, the Wood or Glass Panels in Doors or Partitions Themselves, and Communicating Pipes or Conduits, All Transmit Considerably More Sound Than the Partition Wall Materials.

Professor Watson of the University of Illinois found that when a door was cut into a partition and installed with a $\frac{3}{16}$-inch threshold opening, the relative intensity of sound transmitted through the partition jumped from 0.93 to 7.3 after the door was cut in, and up to 11.7 with an opening of ½-inch. He also found, after constructing what were intended to be soundproof music rooms, that sound was communicated by means of the ventilation system although it had been carefully installed. Ventilator ducts just below the ceiling line are frequently run the length of the building to vent toilet rooms in hotel buildings. Similarly, pipes and conduits in the walls between rooms facilitate sound transmission, as do loose door bucks and trim.

Therefore, it is manifestly unwise to use heavy sound-resistive construction in corridors and elsewhere when it is not feasible to do away with the usual type of unguarded opening. A balance should be struck which will equalize the transmission through the partition proper with that through the doors or around them. After that, the choice should be made on the basis of space economy, cost, weight, resistance to cracking, fire retardance, etc.

TABLE XII—Sound Insulation Ratings of Partitions Based on National Bureau of Standards Data

Total thickness incl. plastering	Type of Partition	Reduction (db.)	Wt., lb., per sq. ft.
	METAL STUD and LIGHT MASONRY		
3 -Inch	Steeltex Hollow on single row 1½" Metal Channel Studs	30.2	17.6
2¼-Inch	Metal Lath and furring—plastered one side only—(c)	33.3	8.1
4½-Inch	Metal Lath Hollow single row 3-inch prefabricated studs	36.9	19.6
2 -Inch	Solid Metal Lath	37.7	17.5
5¼-Inch	4" Hollow Clay Tile	37.8	27.5
4¼-Inch	3" Hollow Gypsum Tile	38.1	21.0
5¼-Inch	4" Hollow, Light Cinder Block	38.6	29.7
2½-Inch	Solid Metal Lath	39.2	21.5a
	HEAVY MASONRY and DOUBLE METAL STUD		
9½-Inch	8" Hollow Clay Tile	45.9	48.0
9 -Inch	8" Solid Brick Walls	50.5	92.0
b9¼-Inch	Double Hollow Clay Tile	52.3	50.0
4½-Inch	Metal Lath Hollow, two rows ¾" chan., metal cross ties	45.7	17.5
4½-Inch	Metal Lath Double, two rows ¾" chan., no cross ties—(d)	52.9	17.5
5½-Inch	Metal Lath Double, two rows ¾" chan., no cross ties—(d)	53.3	17.5
7 -Inch	Metal Lath Double, two rows ¾" chan., no cross ties—(d)	54.1	17.5
10 -Inch	Metal Lath Double, two rows ¾" chan., no cross ties—(d)	55.2	17.5
	WOOD STUD		
5⅜-Inch	Wood Studs, Wood Lath	35.7	15.1
5⅛-Inch	Wood Studs, Metal Lath	39.2	20.0
5⅜-Inch	Wood Studs, Gypsum Lath	41.1	15.2
7⅛-Inch	Staggered Studs, Metal Lath	49.8	19.9

(a) Estimated weight.
(b) No plaster, but Flaxlinum fill in hollow space, Flaxlinum strips under.
(c) Half of double stud partition.
(d) Set on cork.

VII Crack Resistance
VIII Sanitation
IX Dead Loads
X Hollow Partitions
XI Double Partitions

CHAPTER VII

Crack and Impact Resistance of Partitions and Their Effect on Maintenance, Safety and Sanitation

Digest and Recommendations:

Daily, in almost every type of building, partitions are subject to impact or shocks which may cause unsightly cracks and thus entail a substantial outlay for repairs and redecoration, if not total reconstruction. Furthermore, partitions used for enclosing stairshafts and corridors are necessary safeguards to life, and therefore their ability to resist destruction and remain intact under extreme service conditions is of greatest importance.

(a) Each coat of plaster used in Metal Lath Solid Partitions is securely and inseparably bonded to the preceding ones, and the first coat is bonded to a continuous steel web of Metal Lath. Two inches of such solid plaster, fortified by a continuous two-way reinforcement of Metal Lath attached to sturdy steel channels, makes of solid partitions a monolithic girder anchored and tied integrally into floor and ceiling and firmly keyed into metal door bucks. Such construction is particularly well adapted to resist tension and shear, and therefore well-nigh invulnerable to the effects of impact or vibration. It reinforces the bucks in a manner superior to other types because of the steel mesh, and thus safeguards against impact cracks at openings.

(b) In Metal Lath Hollow Partitions the resiliency of the studs makes this type of construction particularly well suited to resist sudden shocks or vibration.

(c) Other constructions built of separate non-continuous units, bound together only by mortar or plaster without the steel mesh reinforcement, necessarily have less resistance to tension and shear stress; and therefore when subjected to impact or vibration are less able to resist destructive cracking.

(d) Flexure tests made on full-size partitions 9 feet high have shown that Metal Stud Partitions have an unusual degree of elasticity under lateral load and can deflect considerably without detrimental effect. After cracking at the elastic limit, increased loads produced somewhat increased deflections, but ultimate failure of the partitions was not produced with deflections of as much as 1-inch. Upon release of the load the partitions returned to an average permanent set of only .33 inch, were straightened out, and with the plaster patching of the single horizontal crack (the steel studs and Metal Lath being intact), were again in service.

(e) Similar horizontal flexure tests on partitions made of plain masonry units show that their Elastic Limits and Ultimate Strengths are reached at about the same time. As soon as a crack appears, due to lateral loading (a failure usually occurring at mortar joints), the partition has also failed and must be destroyed since its limit of usefulness has been reached because of the danger of total collapse.

1. Crack Resistance at Door Openings

Cracks will occur most frequently at openings in certain types of partitions because the partition is usually weakest there and because of the impact of slamming doors.

Masonry partitions utilize reinforcing around openings with strips of Metal Lath to prevent impact cracks. These reinforcements are 1-foot wide on each side of openings. In addition, steel-reinforced lintels are necessary to carry the units over borrowed-light partitions and other long span openings.

There is also a difference in settlement in the mortar joints between the partition proper and the portion above the door opening, which will result in vertical cracks at its sides from top of opening to ceiling. One-foot wide strips of Metal Lath should also be used over both faces of the masonry to reinforce it at these points. However, many builders recognize the superiority of Metal Lath for such conditions and when not employing it throughout, use it specially for the portion between the door-head and ceiling, omitting the masonry units and also saving the cost of the lintels.

On the other hand, in Metal Lath Partitions, investigation of hundreds of installations shows that because of the superior and positive anchorage of the door bucks to the body of the partition, as well as to both floor and ceiling, and because there are no mortar joints, such cracks are usually prevented. (*See* CHAPTER XIII, PART II.)

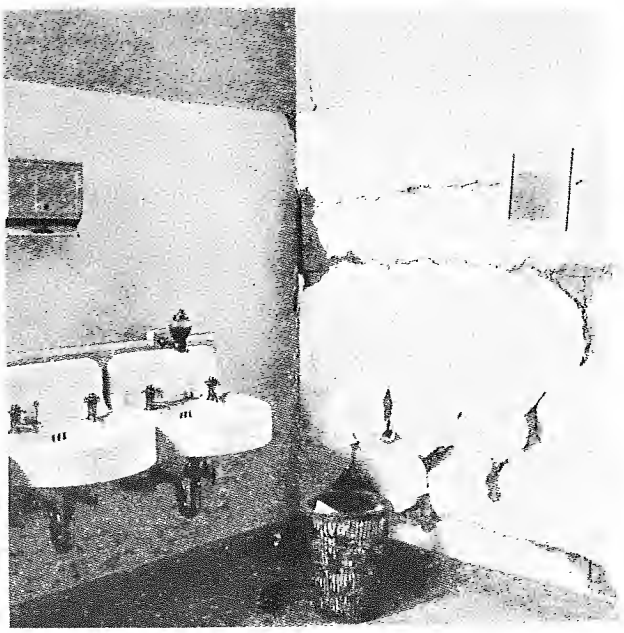


Fig. 36. Metal Lath Partition (left) Survived Santa Barbara Temblor, but Adjoining Block Partition (right) was Badly Damaged.

2. Tests Prove Girder-like Crack-resisting Property of Metal Lath Partitions

To ascertain the "girder" effect of Metal Lath Partitions in resisting cracks, school officials in Pittsburgh, Penna., built a full-size test partition, and subsequently cut away all the supporting floor construction excepting at the very ends of the partition. When the partition carried itself over this long span without settlement or crack they were convinced that its girder-like properties made it particularly immune from cracks due to settlement and therefore superior in this respect to other types of fireproof partitions.

3. Accident Confirms Impact Resistance

When the Construction Department of Libby, McNeil & Libby, Chicago, designed a factory with a 2-Inch Solid Cement Plaster and Metal Lath Partition 150 feet long and 16 feet high, they hardly anticipated the following incident described by the architect:

> "About eight weeks after the erection of this partition, the owners were moving machinery into the building, and the workmen in placing a large punch press, weighing approximately 5,000 pounds and about 8 feet in height, allowed it to tip over and rest against the partition at a sharp angle. I was surprised upon examination to find that the only damage to the partition was a slight dent in same, where the top of the press had struck."

Cases such as the above are common occurrences in warehouses, factories, machine shops, etc., where anything from heavy packing boxes, machinery, or castings, to safes may be accidentally dislodged and fall or be shoved against the partitions. In garages there is the impact of automobiles. In school rooms there is jostling of pupils against partitions.

Similar conditions exist in partitions around penthouses, elevator shafts and adjacent to crane runways where there is constant vibration of moving machinery. For all these, the toughness and resiliency of Metal Lath Partitions as described in the incident above, are specially suited.

4. Tornado and Hurricane Effectively Resisted

The structural superiority of Metal Lath Partitions was dramatically demonstrated in the St. Louis tornado of 1927 which devastated six square miles of the residential section. In the destruction of the auditorium of the Central High School of that city, students found the only avenue of escape a corridor with partitions of 2-Inch Solid Metal Lath and Plaster. This *remained intact* despite the impact of tons of brick, steel and concrete which bent and slightly deflected, but did not dislodge it, *thus providing safe egress and saving the lives of the children.* In many other instances in this tornado, impacts entirely dislodged and destroyed partitions of ordinary construction and of masonry block.

The superior strength of Metal Lath Reinforced Construction was also strikingly demonstrated in the Florida hurricane of 1926. In the midst of the ruins of other types of construction, a Fort Lauderdale dwelling built with 2-Inch Metal Lath Cement Plastered Walls was certain refuge for those whose homes were destroyed.

5. Explosion Fails to Destroy Metal Lath Construction

Resistance to explosion is an important requisite for partitions used as enclosures in factories and storerooms, where explosives are used in manufacture, and in hospitals where storage is provided for highly inflammable X-ray and motion picture films.

> *"Metal Lath Partitions resisted explosion in a striking way in the explosion and fire which threatened the plant of the Western Shade Cloth Company of Chicago in 1924," (also see Page 31),* as reported by John Plant of the Fire Prevention Bureau of the Chicago Fire Department; who further said:
>
> "On the fourth floor of this five story building is a mixing room where nitro-cellulose compound is used. The south and west walls of this room are of brick, the north and east are constructed of Metal Lath on Metal Studs.
>
> "The immense force developed by the explosion pushed out the exterior walls of the building, although they did not collapse. After the fire was over it was necessary to jack up the floor beams to let the walls come back into place.
>
> "*But the Metal Lath and Plaster Partitions withstood the force of the explosion perfectly.* Although the force of the explosion and the volume of fire in the room was great, none of the fire got beyond the partitions. When the fire department arrived at the scene it found fire confined to the room where the explosion occurred and put out the fire, sprinklers having been put out of commission by the explosion."

6. Metal Lath Partitions Rated Second Only to Reinforced Concrete in Earthquake Resistance

The remarkable resistance of Metal Lath Partitions against crack-producing impacts has been most drastically tested by severe earthquakes. Here the entire structure is subject to settlement and racking stresses which are carried to floors and walls and thence into the partitions.

San Francisco Earthquake, 1906

In this great disaster, masonry partitions were either entirely destroyed or so badly twisted and cracked they had to be torn down and rebuilt, while the Metal Lath Partitions, although exhibiting an occasional crack, were repaired without difficulty and remained steadfast against the fire which ensued. A typical after-the-earthquake-and-fire scene is shown in *Figure 24, Page 27* in which the 2-Inch Solid Metal Lath Partitions remained intact. *This is only one of hundreds of instances where 2-Inch Solid and 4-Inch Hollow Metal Lath Partitions survived both the 'quake and fire.*

Porto Rico—1918

Notwithstanding that large quantities of Metal Lath had been used in the earthquake area, the Government Engineers reported no cases of destruction of plaster on Metal Lath, although numerous buildings were wrecked in this 'quake.

Inglewood, Hyde Park, California—1920

Regarding this 'quake of unusual severity, although Metal Lath was extensively used, C. A. Weatherby, Assistant City Engineer reported that he had not found a single instance of fallen plaster where Metal Lath was used.

Tokio and Yokohoma, Japan—1923

No 'quake in recorded history has caused greater loss of lives and property. Wilbur S. Sample, Engineer for the Fuller Company, after inspecting a number of buildings which had been in the 'quake zone reported (ENGINEERING NEWS-RECORD, Nov. 1, 1923) as follows:

> Interior Partions—" . . . The hollow tile seems utterly unable to withstand the crushing effect of the lateral movement of columns, as evidenced by the crushing and falling of this class of partitions . . . In certain localities where Metal Lath Partitions were used these were more or less damaged but this damage was not nearly so pronounced as in the hollow clay tile partitions . . ."

"If impracticable to use reinforced concrete partitions, the next best in the order named are Metal Lath on Steel Studs, solid brick, hollow brick, hollow clay tile. Reinforced concrete is, of course, recommended because of the additional stiffness awarded to the structure as a whole, but if this seems to be impracticable then use Metal Lath."

Santa Barbara, California—1925

Here again, in vivid contrast to the ruins of masonry partitions and walls, Metal Lath construction stood in perfect shape and without a crack, thus revealing its rugged integrity. (See *Figure 36.*)

Earth Temblors Occur in Many Regions

On the basis of records over a period of years, it is apparent that buildings should be built to resist quakes not only on the west coast of the United States, but also in other parts of the country.

After extensive investigations, Jacob J. Creskoff, eminent consulting engineer reported to the American Concrete Institute on February 25, 1937:

"There is probably no part of the United States which has not experienced destructive earthquakes, although some sections are at present more active than others. No region, however, can be assumed to be immune from the possibility of earthquake damage.

"Analysis of earthquake damage indicates that only structural materials which can withstand the bending reversals of vibration are practicable in earthquake-resistant construction . . . Rigid exterior and interior walls must be of adequate strength, located symmetrically on the plan, and designed as vertical beams . . . Metal Lath Partitions, fastened to the frame, are favored . . ."

Earthquake Insurance Rates Prove Value of Shatter-proof Partitions

With recurring temblors on the Pacific Coast, earthquake insurance has mounted until it now reaches stupendous sums with the premiums running into millions of dollars annually. Earthquake insurance, required by many investment houses before a Pacific Coast building loan will be financed, is so expensive that it has brought new policies with *"deductible clauses"* as high as 10% of the face of the policy.

Undoubtedly this is one reason why owners and builders in the earthquake zones who must assume the liability for the *"first 10%"* are preferring Metal Lath Partitions because of their well-evidenced structural stability. Respecting this, Ralph McLeran & Co., prominent Pacific Coast Contractors, write:

"We have used 2-Inch Solid and 2¾-Inch Solid Partitions on the Elks Building, also the San Francisco Women's Club Building, both in San Francisco . . . and in our own Hotel Building at Merced, California, using 2¾-Inch Solid for the corridors and 2-Inch Solid for all other partitions. All of these buildings cost over a million each.

"We believe them to be superior to tile or gypsum block or any partition using wallboards, particularly in a country subject to earthquakes."

7. Other Reasons Why Metal Lath Partitions Afford Superior Resistance to Vibrations and Shocks

High compressive strength (an important property in bearing partitions), is immaterial in non-bearing partitions which carry only their own weight. Conditions involving resistance to tension and shear are often encountered and to resist these Metal Lath Partitions are admirably fortified with steel continuous in both directions.

Other constructions, made up of individual units in which the plaster base is not continuous or does not supply the metallic key and steel reinforcement for the plaster, are less able to resist forces which tend to cause cracks where the board sheets meet at supports, or at junctions with door bucks.

The monolithic nature of Solid Metal Lath Partitions with their inseparably bonded coats of plaster tightly trowelled into each other and into the Metal Lath Reinforcing Mesh, has already been mentioned. Such construction, as shown by tests, must necessarily possess density and strength superior, in vibration and shock resistance, to partitions made of un-reinforced pre-cast units held together only by mortar, as well as those poured in place.

8. Tests Show That Great Elasticity of Metal Stud and Metal Lath Partitions Provide Reserve Against Destruction

A series of deflection tests were made by Rex L. Brown of the Engineering Experiment Station, Univ. of Illinois, in 1935 as follows:

Each of a series of five partitions 8½ feet high, with top and bottom ends fixed, was loaded with a concentrated center load equivalent to a uniform load averaging 181 pounds per foot of partition for the series, before the first horizontal crack occurred. Loading was then continued until an average distributed load of 246 pounds per lineal foot was reached (when deflections averaged .95-inch) without attaining the ultimate strength of the partition. When the load was removed the partition deflection declined until a permanent set of only .32-inch was noted.

This was a remarkable demonstration of elasticity considering that a deflection of about *3 times* the computed permissible deflection had been reached without destruction. Furthermore, the partitions were straightened without difficulty, and after the plastering adjacent to the crack had been repaired, (the Metal Lath providing the necessary mechanical bond) each of the five partitions tested was put back into service.

Tests of these partitions ran from stud spacings of 12 inches up to 36 inches, all giving substantially the same results and showing conclusively that the spacing of the studs does not affect the stiffness of the partition and that where greater stiffness is desired the thickness of the solid plaster should probably be increased.

In another series of tests, using masonry block partitions, it was demonstrated, after deflections were increased to the point of cracking, at which time the elastic limit was reached, that ultimate failure was reached simultaneously.

Due to the comparative slenderness of such partitions, in relation to their height, and because they have no steel reinforcement, they cannot, after they have cracked across transversely, be restored for effective use.

9. Metal Lath Partitions Particularly Valuable in Buildings With Long-term Amortization

Construction of rugged durability and minimum repair expense is required where fixed charges are to be spread over long periods of amortization. Doubtless, it was chiefly because 2-Inch Solid Partitions rank at the very top in these respects that they were chosen for a preponderance of all partitions used in buildings constructed *(see* PLATE II*)* under the supervision of the PWA Housing Division of the Interior Department *(superseded, 1938, by U. S. Housing Authority)*, and in many large scale private projects such as Parkchester, New York City, (Metropolitan Life Insurance Company, owners).

CHAPTER VIII

Sanitation Properties of Partitions and Partition Materials

Digest and Recommendations:

As factors in the preservation of health and the prevention of contagion the sanitation properties of partitions are three-fold:

(a) It is required that the partitions and the finishes applied to them shall be such that (1) by their very nature they will largely prevent the collecting of dust and harboring of disease-carrying bacteria or vermin, (2) the partitions should be so constructed that mice, disease-breeding rats and infesting termites cannot gnaw and bore their way into them and find a place to nest and breed, and (3) the finishes used may be readily and economically cleansed.

(b) Partitions with sanitary properties are an important requisite throughout hospitals and schools and similar institutional buildings, and in those parts of every building used for toilet, shower room and laundry facilities. They are also of great importance in buildings used for the preparation, serving and storage of foods.

(c) Another property of partition finishes which is closely related to the technology of sanitation and particularly its economies, is that which has to do with building maintenance. In practically all rental properties it is customary for the tenants to expect and receive a refurbishing of walls and ceilings at least once a year. Therefore, from the building manager's viewpoint, the materials used and the finishes applied on them must be such that the desired maintenance can be furnished at minimum cost.

1. Dust Free Premises Reflect Good Management

Maintenance of health by cleanliness is *housekeeping* in its broadest sense. The average citizen receives a most liberal and complete education via various forms of advertising in the essential importance of germ-free conditioned air, spotless floors, walls and ceilings. The objective of all this is to inform us that air-borne germs, which transmit disease, are harbored by dust accumulations on and in various surfaces.

So dust-free premises are the hall-mark of a well-groomed house, and it is therefore only natural that the interior of every building should be so constructed and finished that opportunities for dust accumulation are reduced to the absolute minimum.

2. Aseptic Properties of Plastering Are Based on Its Inorganic Nature

The use of clean, antiseptic plastering as a means of providing sanitary, healthful, dust-free dwellings may be traced to the days of antiquity. Undoubtedly the cleansing virtues of plaster were and are attributable to the belief that a fresh coat of plaster kills disease germs, or the fact that in sealing them into a wall it renders them virtually harmless. Also probably equally important is its smooth, dense surface which permits the immediate discovery and removal of dirt and grime which carry disease.

Plaster is made of inorganic material which of itself is decomposition-proof. That is why plaster is to be preferred to the organic materials used in so many synthetic building finishes which are used as plaster substitutes. In the presence of dampness they may, themselves, become the sources of odorous, unhealthful, disease-spreading fungi and molds which thus become both food and shelter for germs and vermin.

3. Modern, Seamless and Jointless Plastering Affords Minimum Opportunity for Lodgment of Dust and Grime

Modern plastering is seamless. Its surface offers no gaping joints in which dust may collect or vermin may hide. Because of its comparative smoothness and density of surface, which can be maintained by painting and other means of decoration, it affords minimum opportunity for the casual adherence of dust particles, grime, soot and the lodgment of vermin. And, as detailed in CHAPTER VII, plastering on a reinforcing base such as *Metal Lath* is so fortified that it maintains this integrity of the surface, generally free of cracks.

4. Rough, Fibrous Unplastered Finishes Generally Unsanitary

A number of the finishing materials which have been advocated largely because they are "dry-wall" and require no plastering and are therefore presumably *low* cost are in reality *high in cost* when viewed in the light of total expense for the life of the building.

These consist of units having a rough fibrous finish. Such materials not only provide a surface as an initial ever-ready catch-all for dirt, disease germs, etc., but many are of the type which will continue this liability for the life of the building, unless replaced.

5. Monolithic Reinforced Plastering vs. Factory-built Dry Wall Construction

Let us contrast a seamless made-on and tailored-to-the-job finish such as plastering on Metal Lath, with a factory-built wall, the surface of which is made up of large units delivered to and assembled on the job. The former is essentially monolithic construction without joints and thus, collectively, is enabled to resist deformation which would ordinarily produce cracks which catch dust and grime. The latter must necessarily have a number of joints most or all of which are lines of weakness in the assembly, whether covered with unsightly batten strips or not. In fact, batten strips merely advertise the presence of joints—hiding places for vermin—an admission of weakness.

Experience has shown that frequently the units and those portions of the wall surfaces along the joints between the units react differently in their resistance to dampness, vibration and impact. Hence, with equal certainty, cracks or disfigurations appear sooner or later to outline the factory-built units; and the satisfactory repair of such cracks is quite difficult because crack-filling material finds little to bond with or adhere to.

6. Metal Lath Partitions Rodent-proof

Wherever food is prepared or stored the ever-menacing rat and other rodents will be found. In many of the synthetic types of wall and partitions we find materials quite incapable of resisting the vicious attacks of these predatory animals; and once they gain entrance into the hollow spaces of walls and partitions they craftily resist all efforts at dislodgment. They are potent spreader of disease and their eradication is difficult and expensive.

In contrast, the small mesh of the tough steel strands making up Metal Lath is impregnable against even field mice. Therefore Metal Lath, even without plaster, is frequently installed as a protection under floors of buildings used for grain storage, corn cribs, etc. When Metal Lath is used as the base for plastering on solid or hollow partitions the combination is an unsurpassed barrier and safe against penetration of all rodents.

7. Plaster on Metal Lath and Steel Studs Is Termite-proof

In many parts of the country, termites constitute a most serious menace to all forms of wood and its by-products, and to many organic compositions of which cellulose is an ingredient. Unless the chemical-proofing treatment is permanent there is an ever-present hazard. Synthetic boards used as substitutes for plastering are said to have such treatment, but there is danger that the materials used for this purpose will release noxious fumes when exposed to fire.

None of the commonly used plasters, nor the steel in Metal Lath or in Steel Studs provide food for, or can be attacked by, termites. Therefore Metal Lath and Plaster Partitions constitute permanent built-in termite protections.

8. Low Maintenance Cost for Smooth Plaster Surfaces

Damp cloths and brooms are usually sufficient to keep a plaster surface bright and shiny. Being dense such surfaces prevent the *subsequent* infiltration of any particles which may lodge temporarily, and their smoothness facilitates the use of solvents to wash off particles which cannot otherwise easily be removed.

Rough Finished Absorptive Dry-wall Construction Largely Not Maintainable

Although many materials are attractive when first installed, they should be avoided if, because they are too absorptive, too roughly textured, do not take paint well, or crack badly or warp easily, they do not lend themselves to economical maintenance. In this and in other respects, many of the substitutes, which have been advocated in recent years in place of time-tried construction materials, have failed utterly to meet the requirements for maintenance and sanitation.

9. High Rating of Metal Lath Partitions for Sanitation and Easy Maintenance

By all analyses Metal Lath and Plaster Partitions, in which steel reinforcing combines crack resistance with a hard durable plaster finish, receive a high rating from the standpoint of maintenance, of sanitation and preservation of health. Foremost are 2-Inch Solid Metal Lath and Plaster Partitions the surface of which affords no ready harboring place for grime and dust. Their mass is a solid, hard-finished monolith, reinforced by a continuous web of steel, affording unyielding resistance to disintegration and permanent freedom from penetration by vermin, rodents and other disease-spreading animals or organisms.

NOTE: Since sanitation and maintenance of wall surfaces are so closely related, information on methods of applying easily renewable finishes and waterproof plastering will be found in Part II, CHAPTER XXV.

CHAPTER IX

Design of Structural Frame As Affected by Dead Load of Partitions

Digest and Recommendations:

(a) Substantial reductions in the dead load carried by the building effect corresponding savings in the cost of the steel or reinforced concrete structural frame.

(b) Structural savings are made possible through reduction in partition dead load using 2-Inch Solid or 5-Inch Hollow Metal Lath Partitions which weigh only 17 to 18½ pounds per square foot of partition surface, as compared with masonry types weighing 27 pounds and more for an equal area. Thus, for a partition 10 feet high, the dead load saving using Metal Lath may be taken as 100 pounds per lineal foot of partition.

(c) Importance of partition dead-load increases with height of building. For tall buildings the weight of partitions has considerable bearing on the economy of design since the effect of their weight on the cost of the columns increases as the square of the number of stories.

(d) In most buildings with a fireproof structural frame it is customary for engineers to assume a certain number of pounds per square foot, attributable to the weight of the partitions, uniformly distributed over the entire floor area, and to design the structure so that the partitions can be safely located anywhere on the floor. Therefore a substantial difference in the distributable load, due to adopting lighter weight partitions, must have an appreciable effect both on floor structure and columns. Where the weight is not distributed, and beams and girders are designed for specific partition loads, the savings are roughly in the same proportions as for distributed loads.

(e) When charged against the cost of the type of the partitions used the savings in structural materials made possible by the use of partitions weighing only 18 pounds per square foot will run from 11½ to 18½ cents per square yard of partition in an 8-story hotel; and from 20 to 36 cents per square yard in buildings 20 to 40 stories high, as compared with designs using 27-pound per square foot partitions.

(f) To realize maximum savings effective through dead load reduction, original structural design must contemplate use of Metal Lath Partitions.

1. Engineering Analysis of Effect of Dead Loads of Partitions on Structural Design

A. Loadings for Typical Floor

In a hotel building, with rooms about 11½ x 19½ feet, and with bathrooms and closets as in the typical layout of *Figure 20, Page 17*, we find that the total weight of masonry partitions per sq. ft. of floor area is 45 lbs., assuming the weight per sq. ft. of surface of the partitions themselves to be 27 lbs.

2-Inch Solid Metal Lath and gypsum plaster partitions usually weigh only 17.5 lbs. per sq. ft. of partition. At most they weigh only 18½ lbs. per sq. ft. (Hollow Metal Lath

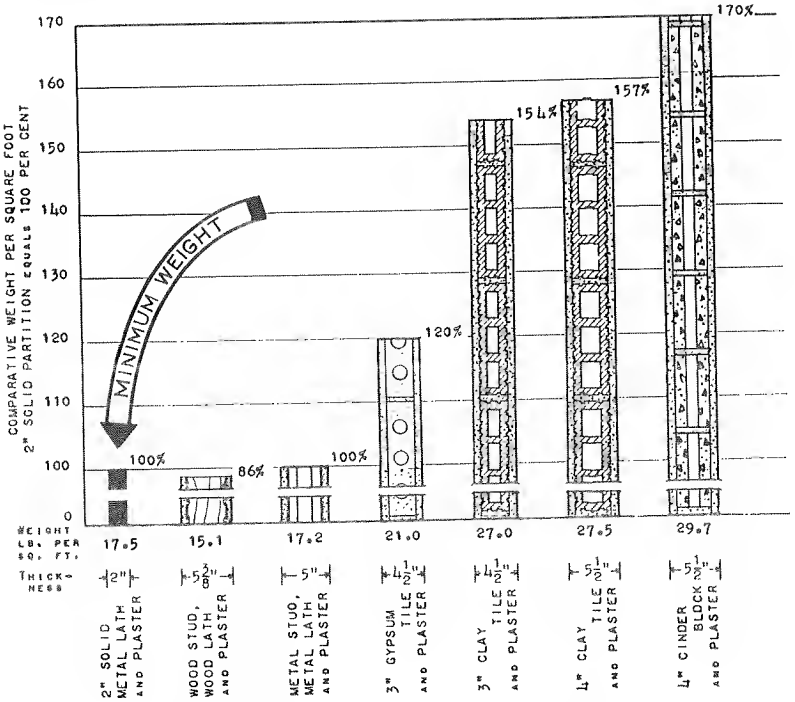


Fig. 37. Comparative Weights of Various Partitions.

Partitions about the same), or 32% less than clay tile partitions and others of similar materials. Therefore the weight of the Metal Lath Partitions will be only about 31 lbs. per sq. ft. of floor area of the building.

Assuming the *dead load* of floor and ceiling construction at 70 lbs. per sq. ft. and the *live load* at 40 lbs. per sq. ft., then with clay tile partitions, the *total* dead and live load is 70+40+45= 155 lbs. per sq. ft. If Solid or Hollow Metal Lath and gypsum plaster partitions are used, the total dead and live load is 70+40+31=141 lbs. per sq. ft.; or a saving of 14 lbs., or 9%.

B. Savings in Skeleton Steel for Typical Hotel Building

Saving in Structural Steel Girders and Beams

The weight of structural steel girders and beams is approximately 10 lbs. per sq. ft. of floor. Of the 9% total saving in combined dead and live loads due to use of Metal Lath Partitions (*instead of 3-inch clay or 4-inch cinder tile and plaster*) ⅔, or 6% may be used to reduce the required weight of the floor beams and girders. The full 9% is not taken because the amount of steel required does not reduce in the same ratio as the decrease in load. A study of standard beam tables indicates that the weight of steel is reduced approximately 10 lbs. for a corresponding reduction of 15 lbs. in the load carried, hence the factor of ⅔, or 6%.

Thus 6% of 10 lbs.= 0.6 lb., which, assuming steel @ 4½ cents per lb., *makes a saving of 2.7 cents per sq. ft.* For an average hotel of 10,000 sq. ft. area per floor, there are at 2.7 cents per sq. ft. the following savings for various numbers of stories "*n*". *(See Table XIII, Page 50)*

IX Dead Loads
X Hollow Partitions
XI Double Partitions

TABLE XIII

Number of Stories "n"	8	12	16	20	24	30	40
Floor Area in Thousands Sq. Ft.	80	120	160	200	240	300	400
Savings in Structural Steel Beams & Girders	$2160	$3240	$4320	$5400	$6480	$8100	$10800

Saving in Columns and Footings, Structural Steel

Savings in column steel can be computed by assuming that the lightening of the floors will effect a lightening of the vertical steel:

Since 1-sq. in. of metal carries 14,000 pounds and weighs (*with connections*) 4 pounds and costs (*at 4½ cents a pound*) 18 cents per ft., 1000 lbs. carried 1-ft. in height costs $18 \div 14 = 1.285$ cents.

If "p" pounds of weight are saved on each square foot of floor of a many-storied building (say of n stories), the average saving in weight will be the same as if $p \times n/2$ pounds are saved for the total height of the building. Let h be the average story height, then for each square foot of building of the height of $n \times h$, there is saved just $p/2 \times n^2 \times h$ lbs. to be carried 1-foot in height. Now if the average floor area be A square feet the saving is $A \times p/2 \times n^2 \times h$ lb.-ft.

It has been shown that 1000 pounds carried 1-foot cost 1.285 cents: hence the total saving is $A/1000 \times p/2 \times n^2 \times h \times 1.285$ cents.

These formulas will now be applied to a specific job:

Assume a hotel 60 ft. x 165 ft. in plan with 9-ft. ceiling height.

Then $A = 10{,}000$ sq. ft. $h = 10.5$ ft. $p = 14$ lbs. (*as shown above in (A)*). Substituting these values in the formula for various numbers of stories ("n"), and, adding 15% for the footings for the various heights of building, we have:

TABLE XIV

Number of Stories "n"	8	12	16	20	24	30	40
Savings in Columns and Footings	$695	$1564	$2784	$4344	$6256	$9775	$17378

Total Savings in Cost of Structural Steel and Footings by Use of Metal Lath Partitions

Combining figures in the two preceding Tables, we have:

TABLE XV

Number of Stories "n"	8	12	16	20	24	30	40
TOTAL SAVINGS	$2855	$4804	$7104	$9744	$12736	$17875	$28178

2. Savings Applied to Cost of Partitions in Typical Hotel

In a 10-story hotel with the floor size of the Neil House (*Figure 20, Page 17*), assuming 8½ stories divided into guest rooms, there is a saving on the basis of Article B, of the foregoing analysis, of approximately $6,652 in the structural steel and footings.

Nor does this take into account additional savings in columns and footings due to the decrease in actual dead load of the floor which is made possible by the lighter partition load.

Divided among the approximately 36,000 square yards of partitions it shows a saving of 18.5 cents per square yard which should be credited to the use of Metal Lath as against the heavier clay or cinder tile, had they been used.

In buildings with a reinforced concrete structural frame, the savings in reinforcing steel for floors, columns and footings due to lesser partition load, although not exactly comparable and susceptible of the same analysis as the structural steel in a frame of that type, nevertheless constitute an important item of first cost saving.

3. Greater Savings in Tall Buildings

Figure 38 is based on the Engineering Analysis, Paragraph B, and shows the relative savings in floor and column steel and footings for various heights of a typical steel frame building. Note the construction cost savings increase more rapidly than the increase in height of the building, the 30-story building saving almost *double* that of the 20-story, and the 40-story saving almost *three times* that of the 20-story. For a 40-story building with floor plan as in *Figure 20, Page 17*, the total saving in structural steel due to using 2-Inch Solid or 5-Inch Hollow Metal Lath Partitions in place of the heavier tile amounts to $84,800. *This is 36 cents per yard of partition*, a very substantial sum.

For concrete frame buildings the proportionate increases in construction cost savings, with increase in height of building, while not so great as for the structural steel frame, are nevertheless considerable.

4. Office and Similarly Subdivided Buildings Afford Equal Opportunity for Structural Savings

In the preceding, typical hotel layouts have been selected to demonstrate structural savings. Similar opportunities exist in office buildings such as shown in the plan of *Figure 22, Page 19*, and in others subdivided similarly.

The dead load saving by using Metal Lath Partitions in tall office buildings, such as the Republic at Dallas, or the Milam at San Antonio *(See Plate 1) totalled approximately 3,000 tons* and this was carried through not only the floor and column design, but also into that of the foundations as well.

5. To Realize Maximum Savings, Original Structural Design Must Embody Use of Metal Lath Partitions

Naturally no change to the use of Metal Lath Partitions with their savings of 10 pounds per square foot of partitions can effect savings in structural or reinforcing steel if the change is made subsequent to the completion of the design. *Therefore Architects and Engineers should contemplate the use of light Metal Lath Partitions in the original planning.*

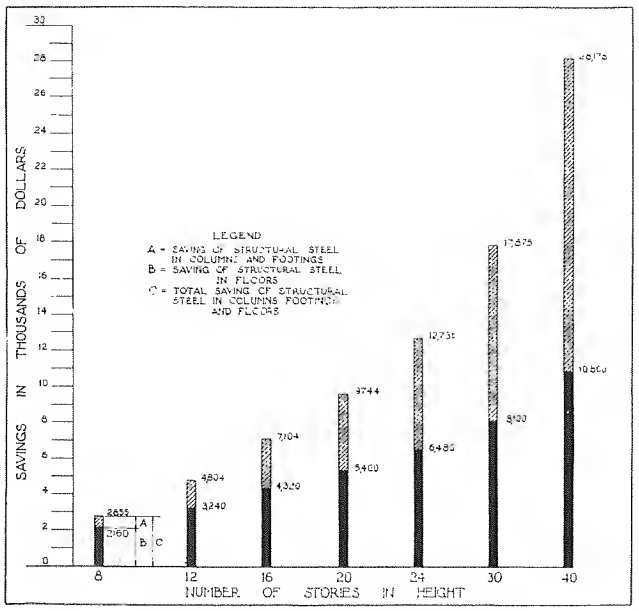


Fig. 38 Decrease in Partition Dead Load Saves in Structural Design of Steel Frame Building

CHAPTER X

Hollow Partitions of Metal Studs and Metal Lath

(For Construction Details See Part II, CHAPTER XXI)

Digest and Recommendations:

(a) For many purposes Hollow Metal Stud and Metal Lath Partitions possess distinct advantages offered by no other types. They are outranked by 2-Inch Solid Partitions only in space-saving and cost, while in several important respects they hold advantages over the solid type. For example, in structures where occupancy requirements necessitate the use of long lines of horizontal conduit or service piping or ducts of any type, or for enclosure of a concentration of vertical service piping, etc., Hollow Metal Stud Partitions provide important construction economies which architects, engineers and builders are utilizing in increasing volume.

(b) Recently, strength and fire tests have conclusively demonstrated that certain types of prefabricated Metal Stud Hollow Partitions, both open and solid web, when protected on either side with Metal Lath and Plaster have fire retardance ratings of up to 2½ hours as bearing partitions. So high a rating qualifies these partitions for many positions in buildings where building ordinances require the use of fire partitions and fire walls capable of sustaining loads and with ratings of 2 hours or more. Non-bearing Metal Stud Partitions also have official 2½-hour fire ratings. It is important that expanded Metal Lath be used with the particular type of plaster which has qualified these partitions for these ratings.

1. New Prefabricated Studs Lower Erection Costs

The cost of Hollow Metal Stud Partitions has been materially reduced with the advent, during the past ten years, of a large variety of special prefabricated studs devised and furnished by a number of manufacturers. *See Part II,* CHAPTER XXI; *Page 92, Plate III.*

This reduction in cost has resulted because less labor and material are usually required than with the separate channel studs and separate tie-separators heretofore used for the purpose. The latter type requires not only assembly to form studs, but also each channel making up the stud must be individually secured to the top and bottom track channel or to floors and ceilings direct.

The manufacturers of the new types of studs have not only eliminated the need for job assembly of the stud units, but they also furnish special accessories in the form of *stud shoes,* or *clips,* or *special track channels* which either singly, or in combination with one another, permit the expeditious unit attachment of the studs to the aligning runners, which in a preceding operation have been attached to the floor and ceiling slabs.

As a result, the difference between the contractor's cost on Metal Lath and Metal Stud Hollow Partitions and Solid Partitions is only the additional cost of the metal lath and its tying on the second side of the partition, plus the cost of the equivalent of a second row of channels.

Although numerous constructions of Solid Partition to 20 and 24 feet in height are of record, it has been found that Hollow Partitions are more satisfactory than the Solid type for heights above 18 feet. This is because the cost of erection for pre-assembled studs is less, in proportion, with increasing heights.

2. Plumbing, Heating, Electrical Installations Simplified

The complicated channelling required for masonry block and tile, in order to accommodate conduit, piping, etc., is altogether eliminated with Hollow Metal Stud construction (*See* CHAPTER XXI). Studs are procurable in various standard all-over thicknesses, and they may be ordered in sizes which will completely house the piping and ducts within the plastered thickness. The elimination of the channelling, and of Metal Lath stripping (to save plastering costs) over the channelling such as is necessary with the masonry, also constitute substantial construction cost savings.

With piping and duct work housed in Hollow Partitions, and thus having little or no contact with the partition construction and plenty of air space around, there is the further advantage that expansion and contraction of the pipes or ducts, caused by temperature variations, are automatically provided for, thus minimizing the danger of plaster cracks.

Piping and Ducts Easily Accessible

The practically continuous hollow space supplies another important advantage in Hollow Stud Partitions used to conceal piping in that it provides ready accessibility with minimum replacement expense for examinations and necessary repairs, changes or additions to the piping. This is an important consideration in residential, housing and apartment construction; and particularly in office buildings. A new strip of Metal Lath is readily tied to the lath either side of the cut section, after the examination or repair is made, and this provides a base for replastering at minimum cost.

In many instances it is possible to secure conduit and outlet boxes to the studs. This greatly simplifies

X Hollow Partitions

XI Double Partitions

Users dix

the roughing-in installation for the electrician, and there is no danger that the boxes will be dislocated before the plastering begins.

A secondary, but nevertheless practical advantage of Metal Lath Hollow Partition installations is illustrated in their use in bathrooms *(See Figures 155-159 inclusive, Part II,* CHAPTER XIX; *also* CHAPTER XXI). Here, the important fact is that noise-deadening wrapping of the piping is made possible by the generally open space on all sides, so that the transmission of objectionable flushing sounds from floor-to-floor can be reduced, if not wholly eliminated. For similar details, see CHAPTER XI on Double Metal Lath and Plaster Partitions, *also Part II,* CHAPTER XXII.

3. Sound Insulation Values Compare Favorably with Other Constructions

(See Also CHAPTER VI)

Recent tests at the Sound Laboratories of the National Bureau of Standards have established the fact that Metal Lath and Metal Stud Hollow Plaster Partitions have a reasonably satisfactory rating as sound insulators. On the basis of results averaged from tests over a range of 9 frequency bands, these partitions, when constructed of double rows of ¾-inch channel iron studs were rated at 45.7 decibels. The single-piece prefabricated Stud Partitions were rated at 36.9 db. These values compare with the 37.5 to 39.2 decibel rating for Solid Metal Lath Partitions; 38.1 db. for gypsum block; 37.8 db. for ordinary lightweight clay tile; and 38.6 db. for lightweight cinder block. In comparison with some of this group, the rating for Metal Lath Hollow Partition with the double row of Metal Studs is sufficiently greater to make a noticeable difference. Such Hollow Stud Partitions are particularly advantageous from the standpoint of freedom from sound conduction, when used between apartments or other tenancies; and also around bathrooms, etc. *(See also* CHAPTER XI, Double Partitions, and *Part II,* CHAPTER XXII.)

4. Fire Resistant Advantages Proved in Actual Fires and Fire Tests

In the long record of fires which have been held in check by Metal Lath construction, are numerous instances involving Hollow Partitions of Metal Studs, Metal Lath and Plaster. The toilet tower in the conflagration at Pocasset Mills, 1938 (*See Figure 25*) was this type of construction. Also the Metal Lath and Plaster stairshaft enclosure at the plant of the Straw Hat Mfg. Co. fire in 1916 (*See Figure 30*) was of Hollow Metal Studs and Metal Lath. In the Baltimore fire of 1904 many buildings were saved by similar partitions.

As described in detail in CHAPTER V, in fire tests at the National Bureau of Standards of Hollow Metal Stud and Metal Lath Partitions, using a double row of ¾-inch channel studs with metal ties at intervals and with sanded gypsum plaster, official 1¼-hour fire ratings were accorded. Endurance, indicating a rating of about 1⅓ hours, was shown by Hollow Prefabricated Stud Partitions with Metal Lath and sanded gypsum plaster. In tests *(1938)* at the same laboratories utilizing the 1-inch wood fibred gypsum or lightly sanded neat gypsum, 2½- 2¼-hour ratings were accorded. On one of these partitions tests were continued beyond the point of failure by heat conduction to *3 hours* without showing signs of failure as a fire barrier. On this basis, and the data given in the following paragraph, Hollow Metal Stud Partitions, with wood fibred plaster of about ¾-inch or slightly greater thickness, on Metal Lath, are entitled to a 2-hour fire rating.

In an earlier paragraph of this chapter reference was made to fire tests on load-bearing Hollow Metal Stud and Metal Lath Partitions in which ratings up to 2½ hours were accorded by a national laboratory in accordance with standard fire tests. Finish averaged somewhat greater than ⅝-inch thick wood fibred gypsum plaster on ⅜-inch rib expanded Metal Lath, and both fire endurance and fire and water tests were passed successfully for the 2½-hour rating. Another panel tested simultaneously, and identical with the foregoing except that the plaster base was *not* Metal Lath, failed, showing only 40% of the endurance of the Metal Lath, and again illustrated that Metal Lath furnishes superior bonding power for the plaster.

As a result of these tests, and the experience of actual fires, authorities throughout the country generally rank Hollow Metal Lath and Metal Stud and gypsum plaster partitions on a par with masonry block and tile up to 4½ inches in thickness.

Fire endurance from 1-hour up to nearly 3 hours may be obtained, by a proper choice of plasters, as between regular sanded mixtures or lightly sanded or wood fibred gypsum, and thus meet all modern code and occupancy requirements. The use of wood fibred or lightly sanded gypsum, while adding only 7% to 10% to the total cost of the partition will more than double its fire resistive value.

5. Dead Load Reductions

CHAPTER IX details many of the numerous weight advantages of Solid Metal Lath Partitions. Being of practically the same weight, all of the many economic reasons which favor the dead-load reduction of Solid Partitions in comparison with clay, cinder tile, etc., also apply to Hollow Metal Lath Partitions.

6. Shock and Crack Resistance

In materials and methods of construction the Hollow Metal Lath and Metal Stud type of partition is comparable to the Solid Partition and hence, also, in its resistance to vibrations and impacts. *(See* CHAPTER VII)

CHAPTER XI
Metal Lath Double and Staggered Stud Partitions

(For Construction Details See Part II, Chapter XXII)

Digest and Recommendations:

Metal Lath Partitions of particularly high sound insulation value consist of two types: the *double metal stud* and the *double or staggered wood stud*. The former, because of the light channel studs ordinarily used, is limited to *non-bearing* construction. However, if bearing steel studs are used for either half of a partition of this type, it can also function for bearing as well as for sound insulation purposes.

(a) Double Partitions, in which the two elements or surfaces are completely separated by air, resist sound much more effectively than Solid or Hollow Partition of plaster or masonry of equal weight.

(b) The sound insulating qualities of double partitions increase somewhat with an increase in the degree of separation between the two faces of the double partition; but the improvement, when the face-to-face distance exceeds 5½ inches, is not marked, and apparently that is the optimum thickness since the space occupied by greater thicknesses would seem to be more valuable than the slightly better insulation afforded.

(c) In non-fireproof apartments and other buildings where a nailed-on plaster base is used, the staggered or double wood stud partition with nailed-on Metal Lath is recommended. With a rating of practically 50 decibels, this form of partition provides a very substantial degree of sound insulation and is likewise much more fire resistive than other forms of wood stud partitions used for the same purpose.

1. Elimination of Structural Contact Between Two Faces Essential

Substantially the only but a *very important construction difference* between Metal Lath *double* partitions and those described as *hollow* construction, is in the manner of assembly of the studs. It is essential that no part of the lath, supporting studs, or members on one face of the partition, should be in any manner directly or indirectly connected with those on the other face of the partition, except at the very top and bottom where it is necessary to anchor into floor and ceiling construction supporting both halves. Even so, in the degree that the common anchorage members or devices are dissociated the sound insulation values will be correspondingly increased.

Of course it is understood that no part of the metal framing or lath or plaster should be permitted to make contact with conduit, piping or ducts in the hollow spaces, since such contact will permit conduction of vibrational sounds originating in adjoining or other parts of the structure.

2. Relation of Amount of Separation to Sound Insulation

As described in detail in Chapter VI, although sound transmission was reduced as the distance between the face of the double partition was increased, the partition with the 10-inch overall thickness was only 2.3 db. better than the 4½-inch partition of identical construction. The 5½-inch partition, a little more easily constructed than the 4½-inch, with a reduction value only 1.9 db. less than the 10-inch partition, is therefore recommended as the most economical for average use.

The tests which established the foregoing (and also *Rule 14 of* Chapter VI) emphasize the importance of the methods used to insulate the edges of the partition from the surrounding walls, floors, and ceiling. Therefore it would appear that greater improvement in insulation will be effected by more attention to *edge supports* than by increasing the degree of separation. The use of a wood base under the partition studs increased the insulation value by 3.2 decibels over the rating when the studs rested directly on the masonry floor. A further improvement of 1.6 decibels was shown when machinery cork was substituted for the wood.

3. Recommended Thicknesses for Housing, Hospitals, etc.

For all practical purposes the 5½-inch thickness has proved very satisfactory and is being used more generally for fully fireproof separations between apartments, for hospitals and other occupancies where a superior degree of insulation is desired. *See also Article 5.*

4. Fire Resistive Properties

Where ordinary sanded gypsum plasters and Metal Lath are used on double steel stud partitions a 1-hour rating can be assumed, based upon fire tests of ordinary hollow partitions of the same type. Where wood fibred gypsum, or lightly sanded gypsum plasters are used on Metal Lath, a 2-hour and upward fire rating can be assumed by similar reference. These fire resistive properties are important where building code regulations stipulate that enclosing walls of apartments and similar tenancies shall have a 2-hour fire rating.

5. Double and Staggered Wood Stud Partitions

Hollow Double Wood Stud Partitions, with the flat face of 2 x 4-inch wood studs set parallel with the faces of the partition, also can only be used for non-bearing. However, where the studs on one side of the partition are set at right angles to the face *(See Figure 185)* it is capable of bearing load. With ¾-inch ordinary sanded gypsum plaster and 1-inch wood fibred, or other unsanded gypsum plasters on Metal Lath, fire endurance ratings of 1 and 2 hours as non-bearing partitions are estimated on the basis of standard fire tests on similar facings for hollow wood stud partition constructions. This use of such Double and Staggered Wood Stud in non-fireproof and fire-protected apartment buildings is therefore recommended.

CHAPTER XII

Versatility of Metal Lath Partitions

The adaptability of Metal Lath Partitions in their various forms results in numerous economies in construction costs. Their well-balanced, space-saving, weight and upkeep economy, coupled with high efficiencies in sound-insulation, crack and impact resistance, sanitation, low cost and their general all-around superiority over other constructions commonly used, give Metal Lath Partitions first place. They are better suited than others for non-bearing subdividing partitions between tenancies, within tenancies and for corridors. They are advantageously used for the enclosures of stairways, elevator shafts, dumbwaiters, penthouses and fan and motor rooms, and for ventilating shafts.

For the convenience of architects, engineers and builders, some of the specific advantages of Metal Lath Partitions in various types of buildings are listed below:

A. Specific Advantages for Housing, Hotels, Apartments and other Residential Occupancies.

(a) Where space is to be divided into numerous small areas such as bed-closets, clothes closets, pantry cases, refrigerator space, etc.

1. Shallow depth of Solid Partitions yields greatest percentage of usable area. In small closets ⅜-inch rib lath can be bent to form partitions without channel studs to reduce thickness and costs still further. Two or three inches makes or mars concealed-bed conveniences, or a cupboard for dishes, etc. Thick masonry partitions are erected with considerable difficulty in small space, and consequently more expensive.

2. Board types of plaster base cut to fit in crowded quarters are expensive because of wastage and difficulty of erection due to special spacing of channels required.

3. Experience shows it is easier to provide full ¾-inch grounds and anchorage for shelving and cabinets on Metal Lath construction than on board types of plaster base.

(b) Over wide openings such as on bed-closets, for door beds hung on doors, for cased openings between living room and kitchenette.

4. Metal Lath and Channel Iron Solid or Hollow Partitions are self-supporting without lintels or special construction over long glass and door openings. In contrast, masonry, block or tile require special steel or heavy wood or concrete steel-reinforced lintels, at extra cost, to carry over openings or an *extra* charge for metal lath over such openings. Without a reinforced lintel or Metal Lath stripping each side and on both masonry faces, from top of opening to ceiling, there is likelihood of plaster cracks due to unequal settlement of the unreinforced masonry units.

(c) For corridor partitions.

5. Because the usual corridor doors and cracks under them offer much less resistance to sound passage than do the Metal Lath Partitions, the latter can be used more advantageously than the more expensive, thick, heavy, masonry partitions. Space-saving advantages of 2-Inch Metal Lath Solid Partitions (which are equivalent to masonry in sound insulation value) should be utilized. Because of the pipe-concealing advantages of Hollow Metal and Wood Stud Partitions their use is also recommended.

6. Fire-resistive ratings of 2 hours and more have been granted various types of Metal Lath Partitions.

(d) For sound-resistive, fire retardant separations between apartments and between guest rooms.

7. Sound insulating Double Metal Lath Partitions are generally cheaper, lighter and less bulky than other fireproof or combustible partition construction now available which has commensurate sound resistance. They have sound-insulation recognized as superior to ordinary masonry block, prefabricated panel or board constructions, and are more insulative than plastered combustible insulation board on single stud construction which is less fire-resistive. Staggered wood-stud and Metal Lath Partitions are also recommended for fire-retardant sound-insulating separations.

(e) Plaster arches over kitchenettes or for opening between kitchenette and living room, etc.

8. Arches of Metal Lath, channel and corner bead, and prefabricated metal arches, are most satisfactorily installed when placed in partitions of Metal Lath and Plaster because of ease in tying to lath and channels.

(f) Bathroom piping, bathrooms, and tiled kitchens.

9. It is cheaper to fur bathroom piping in the clear on both sides with Metal Lath and Channels than to cut masonry blocks to fit between piping. Masonry blocks are held together only by plaster because they are badly cut up and cannot be anchored to ceiling.

10. If double rows of masonry blocks are used to clear piping, they will take up 4¼ inches more of bathroom space than Metal Lath and channel furring each side.

11. Metal Lath can be readily furred away from piping to form sound insulating construction and prevent sound transmission through bathroom walls. Sounds of flushing toilets, etc., are transmitted when masonry blocks are cut to fit between and touch piping connected to fixtures.

12. Whenever glazed encaustic tile is used on bathroom walls or kitchens it is embedded in Portland cement. This is applied most satisfactorily on Metal Lath, and cannot be applied on many other plaster bases. Therefore it is more economical to make walls and kitchens entirely of Metal Lath than to use two kinds of materials.

13. Channels and Metal Lath offer more economical and permanent means of attaching hangers for kitchen sinks.

(g) Around steam piping.

14. Hollow Metal Lath Partitions are preferred when necessary to enclose steam piping, as Metal Lath prevents swelling, warping, and cracked plaster.

(h) Pipe chases in partitions.

15. Pipe chases cut through from face to face of masonry partitions, with small sections of masonry between and Metal Lath over face are not so strong as *continuously anchored* Hollow Metal Lath and channel construction, because masonry cannot be suitably anchored top and bottom.

(i) Stairshafts.

(j) Passenger elevator enclosures.

16. Fire ratings of 2 hours for 2-Inch Solid wood-fibred gypsum plaster on Metal Lath Solid Partitions, 2¾ hours for 2¼-Inch Partition, and ratings of 2½ hours for Hollow Partitions qualify these constructions for these uses.

17. Enclosure walls of 2 to 5-inch Metal Lath reinforced plaster can be built entirely self-supporting, or supported from structural frame at each floor level.

(k) Dumb-waiter shafts.

18. As they require plaster only on one side they can be built self-supporting of channels and Metal Lath in space available, more easily than mechanically possible with other fireproof construction.

(l) For bearing partitions in fireproof and non-fireproof buildings.

19. Metal Stud bearing partitions with unsanded wood-fibred gypsum plaster on Metal Lath on each side receive official 2½-hour rating, qualifying use of this very economical construction in many building codes.

20. Wood stud bearing partitions protected with ¾-inch Metal Lath and sanded plaster each side receive a one-hour fire resistance rating by national fire prevention authorities, Bureau of Standards, Underwriters' Laboratories and others. With mineral wool fill they receive official 1½-hour rating as bearing partitions.

(m) Around door openings.

21. Doors in these occupancies are accorded severe treatment. Metal Lath reinforcing and Metal Studs anchored to floors and ceilings and built-in to act integrally and thus reinforce door bucks at openings, combine to resist impact of slamming doors most satisfactorily. Masonry is usually not dowelled or similarly anchored to ceilings, and board constructions do not have the continuous, shock-absorbing metallic key and reinforcement for the plaster.

B. Specific Advantages for Office Buildings.

(a) For office separations, borrowed-light partitions and wide-cased openings in offices and along corridors.

(See Numbers 4, 5, 6, 7 and 41.)

(b) For alterations, cutting new openings for doors and closing up old ones.

22. With steel channel construction, openings for new doors, etc., can be cut into existing Metal Lath Partitions, and new bucks anchored and frame and trim set without special construction, or lintels, etc., as required for unreinforced masonry partitions. Where old openings are to be closed and usual patching required, new studs can be spliced to existing construction and Metal Lath and new Plaster applied with less difficulty than with other types.

(c) For dismantling partition to meet needs of tenancy.

23. Value of salvaged masonry blocks is *LESS* than labor required to salvage and clean them for re-use, due to adherence of old mortar and plaster, breakage, etc.
Metal Lath Partitions can be readily cut down and removed "en-masse." The net cost of removing Metal Lath Partitions, particularly the hollow type, is no more than that of masonry types.

(d) For altering location of partitions.

24. When partition is to be moved without destruction, and set up again on the same floor, Metal Lath Partitions, because they are 2-way reinforced, can be moved and re-erected without breakage, holding a distinct advantage over masonry or board plaster base constructions which are not integrally reinforced to permit moving.

(e) For general decorative use.

25. Metal Lath and Plaster Partitions permit a greater variety of surface treatment than those built of metal, wood, asbestos or composition panels for use in medical arts buildings, in law offices, in beauty salons, in buildings used for merchandising jewelry, bric-a-brac, etc., and elsewhere where the beauty and decorative value of colored and textured effects are desirable.

C. Specific Advantages for Hospitals, Barracks, Asylums, Sanitariums, Jails, Music and Broadcasting Rooms, Theatres, Assembly Halls and Lodge Rooms.

(a) Sound resistive dividing partitions between patients' rooms, around maternity wards, rooms for convalescents.

26. Sound insulating Metal Lath Double Partitions are least expensive and especially suited for wiring conveniences. See Number 7.

(b) For forcible detention quarters.

27. Use 2-Inch Solid Metal Lath and Portland Cement Plaster Partitions for strength and sanitation. Use sand finish in quarters for mental cases, smooth finish for jails, for washing down, etc.

(c) Partitions in school rooms.

28. Either natural or artificial slate blackboards, bulletin boards, chalk rails, etc., readily installed on solid or hollow types of Metal Lath Partitions. Lath and channel reinforcement provide necessary resistance to rough usage.

(d) For school corridors and exits.

29. Metal Lath Solid and Hollow Partitions provide three to four hour fire barriers and assure maximum protection at minimum cost as fire separations along corridors, around stairways, etc. Metal Lath protected wood stud partitions recommended for all non-fireproof school buildings.

(e) Hospital corridor partitions.

30. See Numbers 5, 6 and 29. Use metal base screed with terrazzo base or metal base (trim) for minimum upkeep. Ceilings acoustical treatment recommended.

(f) For locker recesses.

31. Metal Lath and Channel recesses to provide locker space in corridors can be built more economically than other constructions which require heavy supporting members.

(g) Partitions and walls of rooms used for instruction in music, for radio broadcasting, etc.

32. Sound insulating Double Metal Lath Partitions are cheapest, lightest, and occupy least space in segregating such rooms from other parts of the building.

(h) Separate toilet rooms and dividing partitions between adjoining toilet and shower rooms.

33. Portland cement plaster solid partitions should be used and can be rounded at edges and intersections. Will stand moisture, can be kept sanitary by painting. Use metal base screed in combination with terrazzo base.

(i) Cold storage rooms.

34. Combinations of cork slabs used on Solid Metal Lath Partitions or ground cork with hollow Metal Lath Partitions provides great flexibility in installation, minimum heat loss and satisfactory external appearance.

(j) X-Ray rooms.

35. Barium plaster applied over Metal Lath widely used for this purpose.

(k) Motion picture booths.

36. Metal Lath and Portland cement on small channels or angles is light weight, fire and explosion proof; offers maximum protection to audience and operator, and can be hung from overhead trusses or as balcony. Approved by National Board of Fire Underwriters and principal building codes.

(l) Fan rooms and ventilating ducts.

37. Fire resistive Metal Lath enclosures are light, require no painting upkeep for this use, occupy smaller space and cost less.

(Continued At Bottom of Page 56)

SOME OF THE THOUSANDS OF REPRESENTATIVE STRUCTURES IN WHICH 2-INCH SOLID METAL LATH AND PLASTER PARTITIONS HAVE BEEN USED

Large Scale Housing Developments

East

Fairfield Court, Stamford, Conn.
Old Harbor Village, Boston, Mass.
Newtowne Court, Cambridge, Mass.
Westfield Acres, Camden, N. J.
Newark Housing, Newark, N. J.
Trenton Housing Projects, Nos. 1 & 2, Trenton, N. J.
South Jamaica, Jamaica, Long Island
Hillside Homes, Bronx, N. Y.
Parkchester, Bronx, N. Y.
Park Terrace Gardens (5 bldgs.), New York, N. Y.
Queensbridge, New York, N. Y.
Redhook, New York, N. Y.
Williamsburg Houses, New York.
Syracuse Housing, Syracuse, N. Y.
Utica Housing Project, Utica, N. Y.
Mulford, Yonkers, N. Y.
Glenwood, Philadelphia, Pa.
Hill Creek, Philadelphia, Pa.
Tasker Street, Philadelphia, Pa.
Langston, Washington, D. C.

Central

Jane Addams, Chicago, Ill.
Julia C. Lathrop, Chicago, Ill.
Trumbull Park, Chicago, Ill.
Lincoln Gardens, Evansville, Ind.
Lockefield Garden Apts., Indianapolis, Ind.
Parkside, Detroit, Mich.
Logan Fontenelle, Omaha, Nebr.
Laurel Homes, Cincinnati, Ohio
Lakeview Terrace, Cleveland, Ohio
Cheatham Place, Nashville, Tenn.
Parklawn, Milwaukee, Wis.

South

Smithfield Court, Birmingham, Ala.
Jacksonville Housing Project, Jacksonville, Fla.
Liberty Square, Miami, Fla.
Housing Develop., Enid, Okla.
Will Rogers Courts, Oklahoma City, Okla.
Corpus Christi Housing Project, Corpus Christi, Texas
Cedar Springs Place, Dallas, Texas
Maple Terrace, Dallas, Texas

Hotels

East

Allerton Hotels, New York, N. Y.
American Women's Assn. Club Bldg., New York, N. Y.
International Bohemian Hall, New York, N. Y.
Mills Hotel, New York, N. Y.
New Mills Hotel, New York, N. Y.
Naval YMCA, Philadelphia, Pa.
LaFayette Hotel, Washington, D. C.
Somerset House, Washington, D. C.
Wardman Park Hotel, Washington.

Central

Darlington Hotel, Chicago, Ill.
Hotel Rienzi, Chicago, Ill.
Hotel Wacker, Chicago, Ill.
Hotel Jayhawk, Topeka, Kan.
Heldenbrand Hotel, Pontiac, Mich.
Glennon Hotel, Kansas City, Mo.
President Hotel, Kansas City, Mo.
Park Plaza Hotel, St. Louis, Mo.
Gibson Hotel, Cincinnati, Ohio

(Continued on Page 57)

(Continued from Page 55)

(m) Dressing rooms.

38. Used for space saving, etc.

(n) Proscenium walls.

39. Channel and lath construction facilitates adaptation to architectural design, and can be built to great heights with minimum weight and without heavy supporting construction such as required for masonry.

D. Specific Advantages for Factories, Mills, Mine and Other Industrial Structures.

(a) Enclosures for belt-ways and materials, elevators, passenger and freight elevators, stairshafts and conveyors extending between floors. For penthouses, motor enclosures.

40. Lighter weight, better reinforced construction, fire retardance, greater resistance to explosion and vibration, are advantages of Metal Lath, channel iron and portland cement plaster as compared with masonry, sheet metal or wood sheathing. (See also Numbers 16, 17 and 18.)

(b) General separation purposes.

41. Solid and Hollow Metal Lath Partitions, being reinforced, can be built as high as 30 to 36 feet without great thickness or heavy pilasters such as required for masonry. Because of vibration and crack resistance can be used between office and factory portions and for large variety of separating purposes throughout factory. Occupy minimum space and have excellent fire, and sound retarding properties. (See also Numbers 40 and 42.)

(c) Enclosing rooms used for tumbling stampings, castings, etc., for noisiest parts of shops.

42. Series of sound insulating Double Metal Lath and Plaster Partitions provide maximum resistance to sound transmission and to destruction by vibration.

(d) For toilet and shower stalls and wash rooms.

43. Sanitary toilet towers or balcony toilets of light, Solid, or Hollow Partitions can be built adjoining crane runways without danger of cracking due to vibration of cranes in adjoining bays; require minimum structural support. (See also Number 33.)

(e) Exterior curtain walls.

44. With portland cement concrete make very satisfactory exterior walls between columns and require minimum wall thickness. Adaptable for use with steel factory windows.

TYPICAL INSTALLATIONS

Hotels — *(Continued)*

Addition to Gibson Hotel, Cincinnati.
L. B. Harrison Hotel, Cincinnati, Ohio
Metropole Hotel, Cincinnati, Ohio
Gilsey Hotel, Cleveland, Ohio
Neil House, Columbus, Ohio
Martin Hotel (Addition), Milwaukee, Wis.

South

Hawthorne Hotel, Mobile, Ala.
Arlington Hotel, Hot Springs, Ark.
Hotel Marion, Little Rock, Ark.
Hotel Seminole, Jacksonville, Fla.
Imperial Hotel, Atlanta, Ga.
Piedmont Hotel Addition, Atlanta, Ga.
LaFayette Hotel, Lexington, Ky.
Phoenix Hotel, Lexington, Ky.
Hotel Tyler, Louisville, Ky.
Murray Hotel, Silver City, New Mex.
Reidsville Hotel Trussit, Reidsville, N. C.
Hotel Black, Oklahoma City, Okla.
Hotel Stephen Austin, Austin, Tex.
Beaumont Hotel, Beaumont, Tex.
Hilton Hotel, Dallas, Tex.
Jefferson Hotel, Dallas, Tex.
Plaza Hotel, Dallas, Tex.
Wilson Hotel, Dallas, Tex.
Huckins Hotel, Fort Worth, Tex.
Westbrook Hotel, Fort Worth, Tex.
Bender Hotel, Houston, Tex.
Cotton Hotel, Houston, Tex.
DeGeorge Hotel, Houston, Tex.
Tennison Hotel, Houston, Tex.
Blue Bonnett Hotel, San Antonio, Tex.
Gunter Hotel, San Antonio, Tex.
Robert E. Lee Hotel, San Antonio.
St. Anthony Hotel, San Antonio, Tex.
Tyler Hotel, Tyler, Tex.

West

Baltimore Hotel, Los Angeles, Calif.
Bronx Apartments, Los Angeles, Calif.
Hotel Lankershim, Los Angeles, Calif.
St. Paul Hotel, Los Angeles, Calif.
Senator Hotel, Sacramento, Calif.
Alexander Hamilton Hotel, San Francisco, Calif.
Drake-Wiltshire Hotel, San Francisco, Calif.
Hotel Empire, San Francisco, Calif.
Mark Hopkins Hotel, San Francisco, Calif.
Maurice Hotel, San Francisco, Calif.
Sutter Hotel, San Francisco, Calif.
Forrento Hotel, Seattle, Wash.
Hotel Washington Annex, Seattle, Wash.
Imperial Hotel, Seattle, Wash.
Waldorf Hotel, Seattle, Wash.

Apartments

East

Potomac Apts., Hartford, Conn.
Shenandoah Apts., Harford, Conn.
Chelsea Apts., Atlantic City, N. J.
12 Apartment Houses for Queensboro Corp., Elmhurst, Long Island
1000 Concourse, Bronx, N. Y.
1001 Jerome Ave., Bronx, N. Y.
Penwood Apts., Mt. Vernon, N. Y. (2 bldgs.)
125 East 83rd St., New York, N. Y.
125 West 25th St., New York, N. Y.
67th St. & Madison Ave., New York, N. Y.
96th & Broadway, New York, N. Y.
Hotel Bromley Apts., New York, N. Y.
Van Dycke Apts., New York, N. Y.
Bradford Apts., Washington, D. C.
Brighton Hotel Apts., Washington, D. C.
Burlington Hotel Apts., Washington, D. C.
Calverton Apts., Washington, D. C.
Chatham Courts, Washington, D. C.
Clifton Terrace, Washington, D. C.
Connecticut Avenue Apts., Washington, D. C.
Falkstone Courts, Washington, D. C.
Fansboro Apts., Washington, D. C.
Fontanet Courts, Washington, D. C.
Kedrick Apts., Washington, D. C.
New Hampshire Terrace Guest House, Washington, D. C.
Northbrook and Southbrook Cts., Washington, D. C.

Central

Marine Drive Apts., Chicago, Ill.
River Forest Garden Apts., River Forest, Ill.
Indian Village Manor, Detroit, Mich.
Park Lane Apts., Kansas City, Mo.
Ada Apts., St. Louis, Mo.
Finney Apts., St. Louis, Mo.
Mayflower Apts., St. Louis, Mo.
Sevilla Court Apts., St. Louis, Mo.
St. Regis Apts., St. Louis, Mo.
Winston-Churchill Apts., St. Louis.

South

Doulon Apts., Birmingham, Ala.
River View Court Apts., Phenix City, Ala.
Booker T. Washington Apts., Columbus, Ga.
George Foster Peabody Housing Project, Columbus, Ga.
Georgian Court, Muskogee, Okla.
Melba Apt. Hotel, Dallas, Texas.

West

The Admiral Apts., Los Angeles, Calif.
Benjamin Franklin Apts., Los Angeles, Calif.
Carlton Apts., San Francisco, Calif.
Cathedral Apts., San Francisco, Calif.
Huntington Apts., San Francisco.

Office Buildings

East

Consolidated Gas & Elec. Co. Bldg., Baltimore, Md.
McNally Bldg. Co., Three Rivers, Mass.
Guarantee Trust Co., Office Building, New York, N. Y.
Onondaga Savings Bank, Syracuse, N. Y.
Horn and Hardart Bldg., Philadelphia, Pa.
Philadelphia Electric Bldg., Philadelphia, Pa.
Philadelphia Navy Yard, Philadelphia, Pa.
Monroe Building, Norfolk, Va.
Bureau Engraving Bldg., Washington, D. C.
Sims Keller Bldg., Huntington, W. Va.
First National Bank, Welch, W. Va.

Central

Dexter Bldg., Chicago, Ill.
First National Bank Bldg., Wichita, Kan.
Owen Bldg., Detroit, Mich.
Masonic Temple Bldg., Joplin, Mo.
Argyle Bldg., (Addition), Kansas City, Mo.
Irving and Pitt Bldg., Kansas City.
Capitol Theater, St. Louis, Mo.
General Motors Corp., St. Louis, Mo.
Webster Sunderland Bldg., Omaha, Nebr.
Atlas National Bank Bldg., Cincinnati, Ohio
Gwynn Bldg., Cincinnati, Ohio
Keith Office Bldg., Cincinnati, Ohio
Southern Railway Bldg., Cincinnati.
Caxton Bldg., Cleveland, Ohio
Euclid Heights Theater, Cleveland.
Fidelity Mortgage Bldg., Cleveland.
Park Bldg., Cleveland, Ohio
Penn Square Bldg., Cleveland, Ohio
Sloan Bldg., Cleveland, Ohio
Stillman Theater, Cleveland, Ohio
Swetland Bldg., Cleveland, Ohio
First & Merchants Bank, Middletown, Ohio
Merchants & Mfrs. Bank Bldg., Milwaukee, Wis.

South

Bisbee Bldg., Jacksonville, Fla.
Masonic Bldg., Jacksonville, Fla.
Forsyth Bldg., Atlanta, Ga.
Adis Bldg., Shreveport, La.
Merchants Bank Bldg., Shreveport, La.
Manhattan Bldg., Muskogee, Okla.
Rogers-O'Brien Bldg., Pawhuska, Okla.

(Continued on Page 58)

Office Buildings— *(Continued)*

Dallas County Nat'l Bank, Dallas.
First National Bank Bldg., Dallas.
Praetorian Bldg., Dallas, Tex.
Republic Bldg., Dallas, Tex.
Y. W. C. A., Dallas, Tex.
Anderson Bldg., Fort Worth, Tex.
Flat Iron Bldg., Fort Worth, Tex.
First State Bank, Houston, Tex.
Gulf Bldg., Houston, Tex.
Kress Bldg., Houston, Tex.
Mason Bldg., Houston, Tex.
Builders' Exchange Bldg., San Antonio, Tex.
Menrick Bldg., San Antonio, Tex.
Milam Bldg., San Antonio, Tex.
National Bank of Commerce, San Antonio, Tex.

West

Ferguson Office Bldg., Los Angeles.
Higgins Bldg., Los Angeles, Calif.
National Title Bldg., Los Angeles.
Rives-Strong Bldg., Los Angeles.
Capital National Bank Bldg., Sacramento, Calif.
Forum Bldg., Sacramento, Calif.
Insurance Exchange Bldg., San Francisco, Calif.
Sixty Eight Post Bldg., San Francisco, Calif.
Underwood Bldg., San Francisco, Calif.
Electric Bldg., Portland, Ore.
Lewis Bldg., Portland, Ore.
Arcade Annex Bldg., Seattle, Wash.
Masonic Temple, Seattle, Wash.
Old City Hall Bldg., Seattle, Wash.
Pacific Telephone Bldg., Seattle, Wash.
Sea Board Bldg., Seattle, Wash.

Schools and Hospitals

East

Yale University, New Haven, Conn.
The Cadet's Quarters, Annapolis, Md.
New York School, Bridgeville, N. Y.
U. S. Veterans Hospital, Bronx, N. Y.
Columbia University Dormitories, New York, N. Y.
International House, New York, N. Y.
Warren Street High School, Syracuse, N. Y.
New York Central School, Waterville, N. Y.
McKee Dormitory, Geneva College, Beaver Falls, Pa.

Central

Belleville High School, Belleville, Ill.
Augustana Hospital, Chicago, Ill.
Irving Park Y. M. C. A., Chicago, Ill.
Lawson Y. M. C. A., Chicago, Ill.
Augusta Seminary, Moline, Ill.
Lutheran Hospital, Moline, Ill.
Immanuel Hospital, Omaha, Nebr.
Bethesda Hospital (2 Bldgs.), Cincinnati, Ohio
Good Samaritan Hospital, Cincinnati.
Heberle School, Cincinnati, Ohio
Jewish Hospital, Cincinnati, Ohio
Scarlet Oak Sanitarium (3 Bldgs.), Cincinnati, Ohio
Tuberculosis Hospital, Cincinnati.
Y. M. C. A., Cincinnati, Ohio
East Technical School, Cleveland.
Our Lady of Good Counsel School, Cleveland, Ohio
W. Technical School, Cleveland, Ohio
Ohio State University, Chemistry Bldg., Columbus, Ohio
Lawry & Engelman Halls, of Kent State College, Kent, Ohio
St. Mary's Seminary, Norwood, Ohio
Toledo University, Toledo, Ohio
Methodist Children's Home, Worthington, Ohio
Nurses' Home Lutheran Hospital, Eau Claire, Wis.
Horicon High School, Horicon, Wis.

South

Tennessee Coal & Iron Hospital, Fairfield, Ala.
Selma Hospital, Selma, Ala.
Orange General Hospital, Orlando, Fla.
Nurses' Home, Georgia Baptist Hospital, Atlanta, Ga.
Wesley Memorial Hospital, Atlanta, Ga.
Fourth District School, Covington, Ky.
Y. M. C. A., Mexico City, Mexico
Tuberculosis Sanatorium, McGee, Miss.
Blind Institute, Austin, Tex.
Littlefield Dormitory, Austin, Tex.
Scottish Rite Dormitory for Girls, Austin, Tex.
Baylor College, Belton, Tex.
Industrial Arts School Bldg., Commerce, Tex.
Baptist Sanitarium, Dallas, Tex.
Nurses' Home, St. Paul Sanitarium, Dallas, Tex.
St. Paul Sanitarium, Dallas, Tex.
Y. W. C. A., Dallas, Tex.
College of Industrial Arts, Denton, Tex.
St. Joseph Hospital, Houston, Tex.
Y. W. C. A., Houston, Tex.
Y. W. C. A. Home, Houston, Tex.
American Legion Hospital, Kerrville, Tex.
Rusk State Insane Asylum, Rusk, Tex.
Academy of Incarnate Word, San Antonio, Tex.
Baptist Sanitarium, San Antonio, Tex.
Walter Taylor School, Norfolk, Va.

West

Masonic Home, Decoto, Calif.
Monterey Hospital, Monterey, Calif.
Sacramento County Hospital, Sacramento, Calif.
State Capitol Extension, Sacramento.
Sutter Maternity Hospital, Sacramento, Calif.
Letterman General Hospital, San Francisco, Calif.
St. Joseph's Hospital, San Francisco.
Municipal Auditorium Bldg., San Jose, Calif.
Y. M. C. A., Portland, Ore.

Miscellaneous

East

B. & M. Freight Station, Boston, Mass.
Boston Woven Hose Co., Cambridge, Mass.
Bath Houses at Fort Phoenix, Fair Haven, Mass.
Great Falls Mfg. Co., Somersworth, N. H.
Brighton Long Island Bath House, Brighton, L. I.
Brooklyn Navy Yard (8 Bldgs.), Brooklyn, N. Y.
King's County Court House, Brooklyn, N. Y.
United-Cigar Stores, New York, N. Y.
11 W. 42nd St. Bldg., New York, N. Y.
500 Fifth Ave Bldg., New York, N. Y.
Chevrolet Motor Co., Tarrytown, N. Y.
West Pennsylvania Power Co., Springdale, Pa.
Shambow Shuttle Co., Woonsocket, R. I.

Central

Phoenix Hotel Laundry, Lexington, Ky.
International Harvester Co., Minneapolis, Minn.
Big Chief Hotel Cabins, Pond, Mo.
General Motors Corp., St. Louis, Mo.
Tower Grove Turnverein, St. Louis.
National Malleable Castings Bldg., Cleveland, Ohio
Ohio State Board of Administration, Columbus, Ohio
Lima Locomotive Works, Lima, Ohio
Luckey Lime and Supply Co., Luckey, Ohio
Oklahoma Publishing Co., Oklahoma City, Okla.
Fairbanks-Morse Co., Beloit, Wis.

West

State Capitol Extension, Sacramento, Calif.
Elks Bldg., San Francisco, Calif.
Liverpool, London & Globe Bldg., San Francisco, Calif.
U. S. Government Bldg., San Francisco, Calif.
Western Women's Club Building, San Francisco, Calif.
Municipal Bldg., San Jose, Calif.

PART II — CONSTRUCTION METHODS and DETAILS

(FOR PART I — PROPERTIES OF PARTITIONS — SEE PAGE 5)

(See CHAPTERS XXI, XXII and XXIII for Hollow and Double Partition and Furring Erection Details)

Figure 100 shows graphically the various steps in one of several typical methods used in erection of Solid Plaster Partitions. With relatively minor variations the same procedure is followed for all types of buildings, both fireproof and non-fireproof, viz.:

First, location of the partition, and particularly, locations of openings, are laid out as in "*a*" with reference to the outside walls of the building, in accordance with the architect's drawings. A chalk line is used for the floor layout and it is then plumbed-up and marked on the ceiling.

Second, the bucks for doors and other openings are then placed, plumbed and securely anchored by suitable devices provided for that purpose, to floor and ceiling construction.

Third: Where track channels or runners *(used separately, or in combination with metal base)* are used as a means of providing anchorage and alignment of the studs, these are now placed and secured as in "*b*" to masonry floors and ceiling slabs by suitable attachment devices. Where track systems are not used, holes are punched into the masonry for the channel studs. The channel studs* are then erected by insertion and in some cases tying to the track runners as at "*c*". In others they are erected simply by inserting into the holes cut into the masonry.

Fourth: A horizontal flat bar, strip or rod reinforcement is installed over each opening about 6 to 8 inches above top of bucks and extending past the double studs to just beyond the first single studs each side of opening. It is securely tied to all studs and vertical anchors which it crosses. *(See "c").*

(*) Slightly different procedure is followed for Deep Rib Lath Partitions. See CHAPTER XX.

Fifth: A temporary horizontal brace to align and stiffen the channel studs is wired to them on one side of the partition only. *(See "d").*

Sixth: Electrical conduit and outlets are next placed by electrical workers to connect with runs previously placed in floors or ceilings. *(See "d").*

Seventh: Metal Lath is securely wire-tied to one side only of the channels (away from the horizontal bracing) allowing proper lap or extension on to side walls and ceiling. *(See "e").*

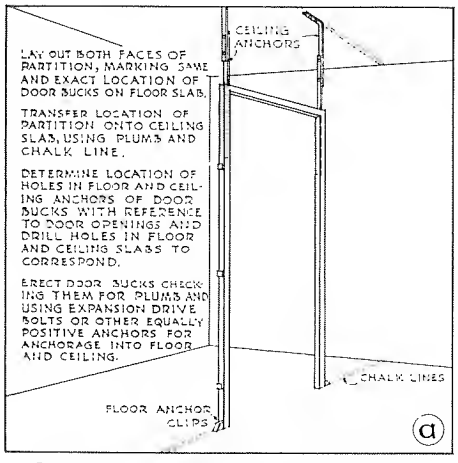
Eighth: Grounds for plaster and trim are then applied; the partition is ready for plaster. *(See "e".)*

Ninth: A scratch coat *(1)* is first applied to the lath side *("f").* When the scratch coat has set fairly hard *(usually over night)* the temporary horizontal bracing on the channel side is removed and a backing-up plaster coat *(2)* is spread over the channel side. Since the plaster is applied to entirely cover the studs to a thickness of nearly ½-inch, the backing-up coat usually requires two operations, both on the same day. It is straightened out with the plasterer's rod and darby to the grounds, allowing for the finish coat.

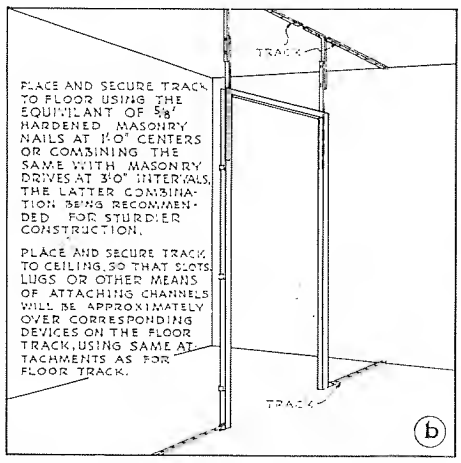
The third, or brown coat *(3)*, is then placed over the scratch coat on the lath side, just scant of being flush with the grounds, after which the fourth and fifth *(finish)* coats are applied on opposite sides making a Solid Plaster Partition two inches thick.

Tenth: When the plaster is thoroughly dry, trim is attached as in the usual manner, electrical devices are installed, and the partition is ready for the painter and decorator.

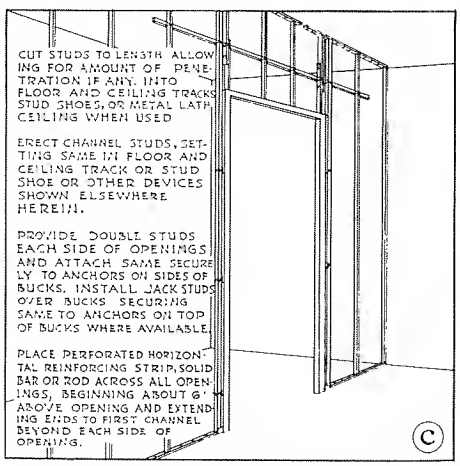
These steps will now be discussed in detail with the help of larger scale diagrams, photographs and references to the chapters on specifications.



Location Layout, Erection, Plumbing and Anchorage of Bucks.

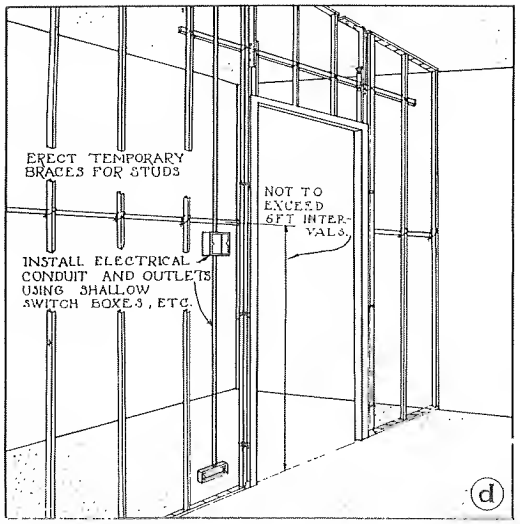


Placing and Securing of Floor and Ceiling Track Channels. (See Figures 104 to 117 inclusive for other methods.)

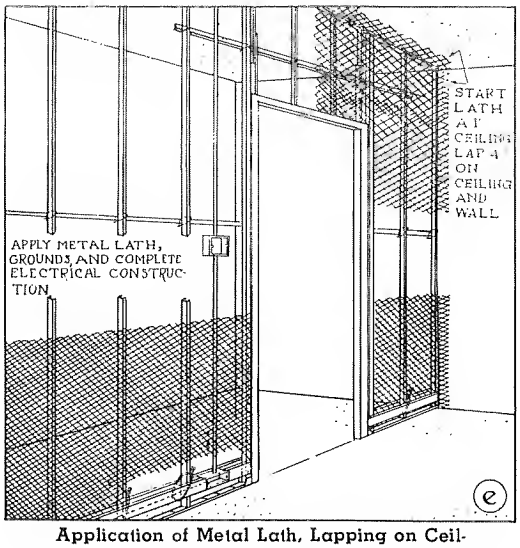


Erection of Studs and Installation of Reinforcement over Door Openings.

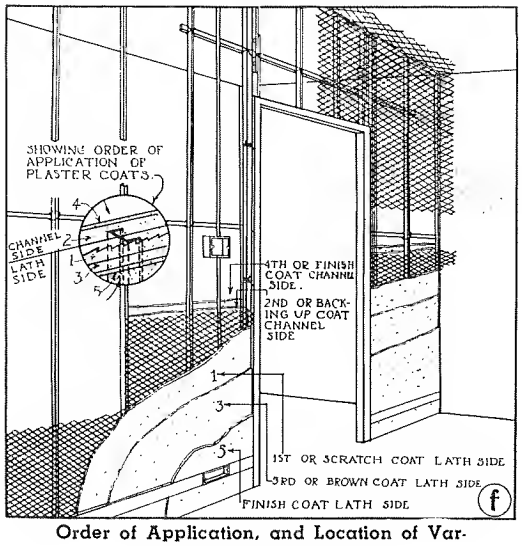
Fig. 100. The A.B.C.'s of Solid Metal Lath Partition Construction



Temporary Bracing of Studs, Installation of Electrical Conduits, Outlets, etc.



Application of Metal Lath, Lapping on Ceiling and Abutting Walls; Application of Grounds.



Order of Application, and Location of Various Plaster Coats.

CHAPTER XIII

Erection of Bucks, Studding, Etc.

1. Door Bucks and Their Erection

Bucks for partitions are of metal or wood. Under the regulations of most building codes in which doors and the trim around them *(even in fireproof buildings)* may be of wood, wood bucks are permissible. In some cities, regulations provide that buildings for certain occupancy and those above certain great heights be equipped with incombustible doors and in these the metal door buck and trim are used.

Manufacture of architectural sheet steel products has now reached the point where it is economical and advantageous to use steel bucks and trim even when not required for fire protection; and their indestructibility, sanitary appearance, etc., have brought metal door casings here to stay. In fact, this change, which has taken place almost entirely since the first edition of this Handbook, has brought revolutionary changes in partition construction practices.

Whether the architect prefers wood or metal, manufacturers of millwork and steel door and trim manufacturers have cooperated to provide a complete line of bucks and trim for Solid and Hollow Metal Lath Partitions. *(See also Sweet's Architectural Catalog.)* Typical construction details pertaining to bucks are given in this Article, and in CHAPTERS XVII and XVIII will be found further information on door casings, trim, etc.

Metal Bucks and Their Attachment To Floors, Ceilings and Partitions

(Specification 1, Article G-a)

Metal bucks are usually of the hollow type and intended to be filled with plaster. They are usually combined buck, jamb and trim and a separate member used as the buck is not provided.

The buck-jamb-trim illustrated in *Figure 101* is typical. *See also Figures 132, 133, 134 and 138B in* CHAPTER XVII. It is provided with special side anchor clips *(2)* which are attached to the adjacent double channel studs passing from floor to ceiling and head anchor clips *(4)* for attachment of the jack studs, all of which make the buck integral with the partition construction. In addition, the steel anchor clips *(3)* welded to the buck at the bottom, and the heavy adjustable bar, rod, or tubular steel anchors on either side of the buck at *(1)* which are permanently and rigidly attached to the floor and ceiling slabs or to special ceiling members by expansion drive bolts, provide strong and secure anchorage to resist impact and dislodgement. The buck is further strengthened by the plaster fill which is forced into it as the scratch and backing-up coats of plastering proceed upward. In *Figures 131 and 134A, See* CHAPTER XVII, the grouting of the casing provides most of the rigidity, although anchors to the channel studs are also furnished.

Somewhat different are the bucks *(See Figures 130, 135 and 136)* which are, as in the first case, not intended to be decorative, or are, as in the others, to be fin-

CEILING RUNNER ANCHORAGE FOR CHANNEL STUDS

CEILING ANCHORS: FASTEN TO CONCRETE WITH AT LEAST TWO RAWL-DRIVES OR EQUIVALENT

T-HEAD: FASTEN TO CEILING WITH RAWL-DRIVES OR EQUIVALENT

WIRE TIE JACK STUD TO SHORT SECTION OF CEILING RUNNER OR T-HEAD OR FASTEN DIRECTLY TO CEILING

Door bucks should be securely fastened to floor, to ceiling, and to double channel studs each side of opening.

Door Bucks are supplied by the Manufacturers with all Anchors and Clips attached.

Alternate Detail "A"

Alternate Detail "B"

VERTICAL SECTION THRU DOOR BUCK AT A-A

SECTION THRU JAMB DOOR OPENING

(1) CEILING ANCHORS

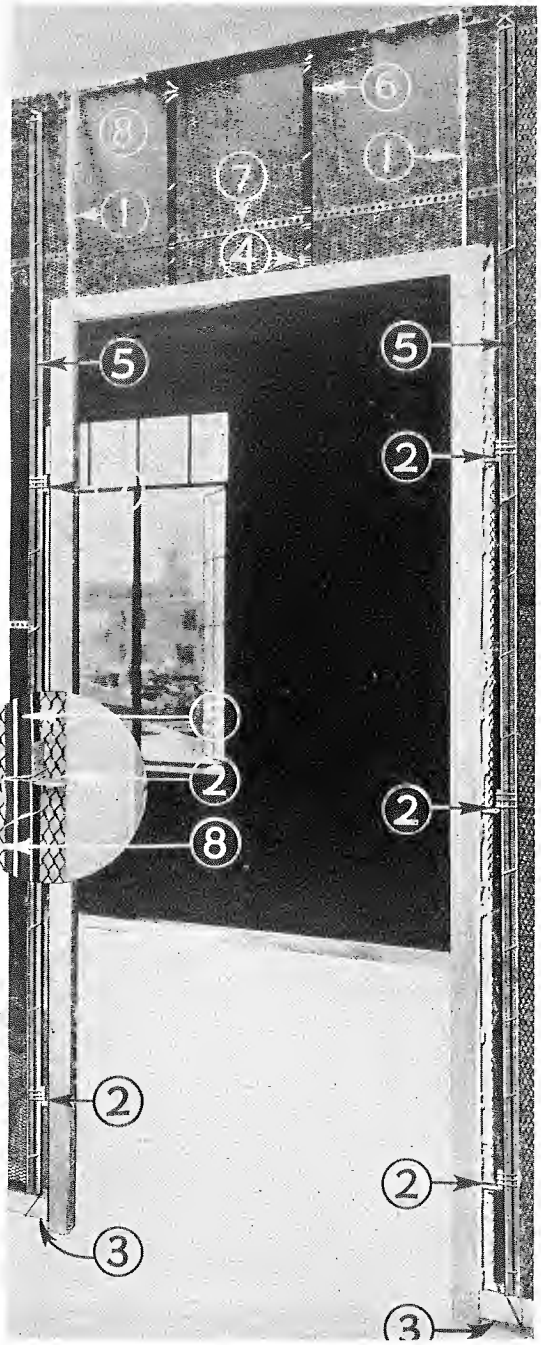
¼" by 1" flat steel bar or equivalent or 1" O.D. steel, tube. One each side of door buck. Anchors or tubes adjustable to allow for varying ceiling heights and securely fastened directly to ceiling or "T" head. Anchor bars extend 2 ft. down on, and are securely welded to, bucks. Tubes are 42" to 60" long and are secured by set screws in side anchor clips.

(2) SIDE ANCHOR CLIPS

At least three welded to each jamb. Outstanding leg kept short so double channel studs will be close to buck. Upstanding legs of clips securely wire-tied to these studs.

(3) FLOOR ANCHOR CLIPS

Welded to each jamb at floor line and so designed that anchorage devices are kept close to buck.



(4) HEAD ANCHOR CLIPS

At least one for any width door buck, but spaced not over 16" o.c.

(5) DOUBLE CHANNEL STUDS

Two channels secured back to back or flange to flange, both sides of every opening. Firmly wire-tied to each anchor clip.

(6) JACK STUDS

As needed to keep stud spacing same as for regular partition studs. Wire-tied to head anchor clips and fastened to ceiling, ceiling runner or "T" head.

(7) REINFORCING OVER ALL OPENINGS

Flat ⅛" by 1" steel strap or ¼" rod, continuous on channel side over all openings and extending beyond double studs to first single studs each side. Wire-tied to all studs and to ceiling anchors.

(8) METAL LATH

Type and weight dependent on spacing of studs.

VERTICAL SECTION THRU DOOR BUCK AT A-A

SECTION THRU JAMB DOOR OPENING

FASTEN FLOOR ANCHORS TO CONCRETE WITH AT LEAST TWO RAWL-DRIVES OR EQUIVALENT DEVICES

FLOOR RUNNER ANCHORAGE FOR CHANNEL STUDS

Scale of Line Drawings: 3" = 1' — 0"

Fig. 101. Alternate Anchorage Details for Combined Metal Buck and Trim used in 2-Inch Solid Metal Lath and Plaster Partitions.

ished with a sprung-on or screwed-on casing. These bucks are customarily bolted to the nearest stud — frequently an angle or tee — with its outstanding leg punched for wire tying. The lower ends of the metal buck are secured to the floor by the same devices shown in *Figure 101*. The head section is wired to a cross channel connecting the studs either side of the buck. In *Figure 130* the buck is also the door jamb, and is a type of construction often used in basement openings, storage warehouses, etc., where ruggedness is essential. Each of these bucks is described in detail under "Metal Bucks and Trim", CHAPTER XVII.

Wood Bucks, Material Requirements and Erection Details

(See Specification 1, Article G-b)

Wood bucks should be made from straight grained lumber wholly free from knots. This will assure a sound nailing base and will expedite the erection of trim for the finished opening.

Wood working mills supply the necessary bucks on short notice in a variety of sizes to meet all requirements. For the 2-inch Partition the buck must be full two inches in at least one dimension since it serves as a ground for the application of plaster. Where 2¼ or 2½-inch partitions are employed the thickness of the buck should be increased to correspond. Bucks cut from dressed lumber of 2 x 2 inch nominal size *(actually 1⅝-inch x 1⅝-inch)* are not satisfactory. However, where the full 2 x 2 bucks are not readily obtainable, bucks each 2 x 1⅝-inch can be cut from 2 x 6-inch stock with but little waste.

Bracing of Door Bucks

(Specification 1, Article G-d)

Before wood bucks are erected, the jamb and head members should be braced against each other to prevent twisting. After erection the entire assembly should be carefully plumbed in both directions and then braced to the floor or ceiling as in *Figure 102*. The temporary bracing to floor or ceiling is removed after bucks are set, but the diagonal bracing of the frame remains in place until after plastering.

Anchoring the Door Buck to the Floor

(Specification 1, Article G-c)

Where wood floor runners are used on masonry or wood floors, the wood buck is carried down to the floor and nailed to the end of the runner or the floor.

Where wood floor runners are not used, the wood door bucks should be secured to masonry floors by nailing a piece of sheet metal to the bottom of the buck *(Figure 110)* and then nailing in turn with hardened masonry or stub nails to the floor. Another method is to drill and plug holes in the floor and toe-nail the bucks to the plugs, or nail to sleepers set in the floor slab at the doors only *(See Figure 146)*.

2. Anchoring and Erecting Channel Studs at Openings

With the door bucks in place, the next step is to place the channel studs each side of the buck and then proceed with erection of remaining studs.

A Double Channel Stud Should Always Be Placed at Each Side of Door Buck and Be Firmly Attached to Floor and Ceiling

(Specification 1, Article C-d)

The resistance to impact of slamming doors and prevention of plaster cracks depends upon satisfactory details at the openings. It is very important that there always be a double channel stud or similar reinforcing member close up to the side of every door buck and at similar openings, to make a satisfactory connection between the door frame and the partition. This stud must run from floor to ceiling, and be well anchored at both ends to the floor and ceiling track runners, or be set in holes cut into the masonry.

Connections Between Studs and Wood Bucks

(Specification 1, Article C-d)

Figure 103 illustrates methods adopted by various lathers for the attachment of the nearest studs to the door buck.

In many localities where wood bucks are used they are not rigidly secured to the nearest channels. The theory is that if too rigidly attached very hard usage would eventually cause formation of plaster cracks beyond the outstanding legs of channels because these would move with the buck, and the cracks would show beyond edge of casing. Therefore the channel is separated slightly from the buck so that any crack which might occur would come between them and would remain permanently invisible behind the casing. *Note that this is quite different from hollow metal bucks in which the plaster fill permits close integration of buck and partition.*

Probably the simplest and most commonly used method to secure a non-rigid attachment between the buck and the adjoining studs is to drive pairs of nails one on each side of the channel and "double wire" the channel to them as in *Figure 103A*. About three-eighths inch is left between channel and buck for ease in tying the end of the lath sheet to the channel. The use of one nail as in *(B)* is not recommended as the buck is apt to twist before plastering and make application of trim more difficult.

If a rigid connection between nearest stud and buck is desired the stud is usually nailed or screwed to the buck as in *Figure 103C*.

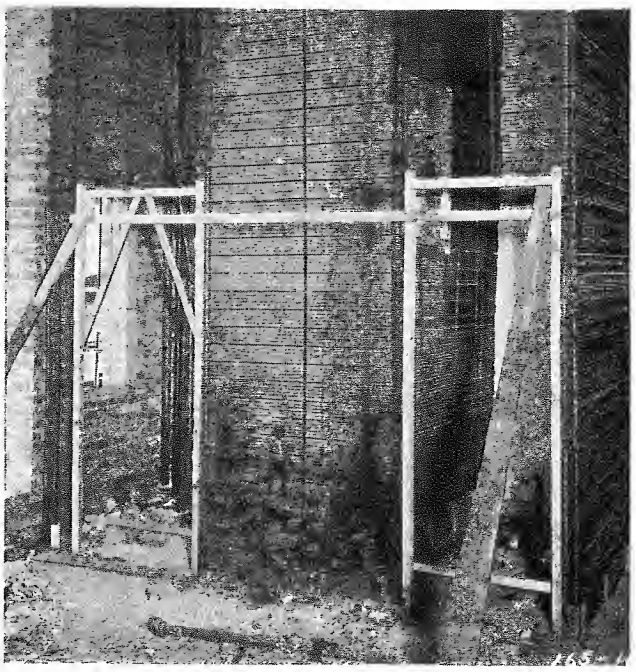


Fig. 102. Cross-Bracing of Buck and Diagonal Bracing to Floor.

Some favor heavier studs for the position nearest the buck and use angles or tees, etc. *(Figure 103D, E and F).*

A washer or staple is usually placed between the channel and buck to facilitate tying *(See Figure 103C).* Such methods are quite commonly used where angles or tees are used as at "*D*" and "*E*".

For heavy duty, where exposure of angle or channel is not objectionable, angles or channels are used continuous from floor to ceiling each side of opening as in *Figure 103-F.*

Reinforcement Over Tops of Openings; Attaching Jack Channels to Tops of Bucks

(Specification 1, Article C-e)

A horizontal reinforcement consisting of a ⅛-inch x 1¼-inch flat bar or a ⅜-inch diameter rod or a perforated flat strip is run across the top of the opening on the channel side of the partition as at *(7)* in *Figure 101,* and extends continuously past the double studs and just beyond the first single studs at each side. This reinforcement is wire-tied to each stud it crosses. The jack or short studs, which extend from the top of the opening to the ceiling, are secured to anchors on the upper edge, in the case of metal bucks, and are also wire-tied to this reinforcing strip.

For average construction, whenever wood bucks are used around doors, the lower end of the short or jack studs over the doors are wire-tied directly to 8-penny nails driven into the head member of the buck and to the above reinforcement without employing a horizontal channel at this point. However, for heavy doors, wide openings and extra good construction it is recommended that, in addition to the reinforcement mentioned above, a horizontal channel be placed over the top of the wood buck and be securely tied to the studs each side of the opening by bending a shoe at each end. The top of the wood buck is in turn held in place by the horizontal channel using the same methods *(wire-tying to nails, etc.)* described in a preceding paragraph for the sides of the buck.

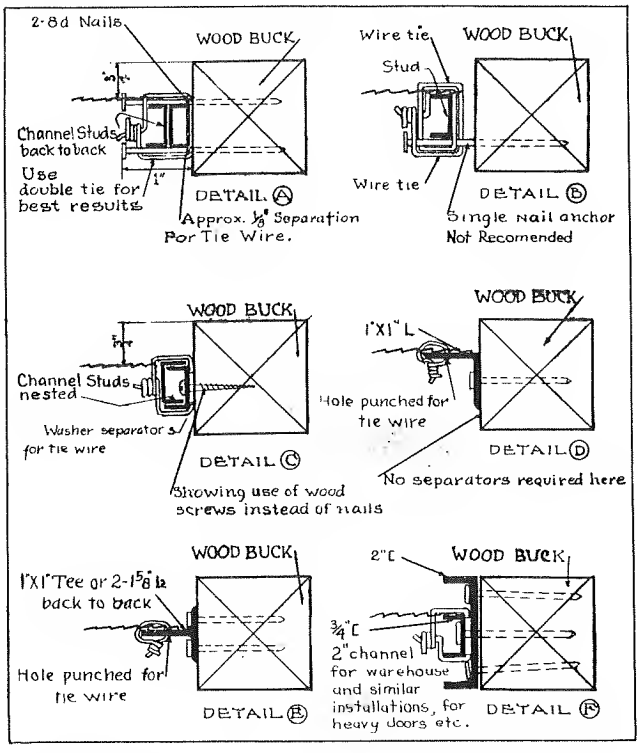


Fig. 103. Methods Used for Attaching Nearest Studs to Door Buck.

3. Anchoring and Erecting Channel Studs for the Partition Proper

(Specification 1, Article C-a-d)

Figures 104 to 115, inclusive, show methods used in anchoring and erecting channel studs in various types of fireproof buildings. Each method has been used in various parts of the country and has advantages to commend it. Notes in the diagram make them self-explanatory.

Two Methods of Anchorage and Erection in General Use

It will be noted that there are two methods in general use for attaching channels to floors and ceilings *(1)*: Notching the floors and masonry ceilings and springing the channel ends into place; or, where the ceiling is Metal Lath, inserting the upper end of the studs through holes cut in it and tying them to a ceiling track-channel tied to the underside of the lath; or *(2)*: Using metal channel or angle or metal strip tracks, or combinations of them at the floor and ceiling, inserting the channel studs in holes or deformations provided in, or shoes or clips attached to the tracks or bending shoes on the studs and wire-tying them to plain track channels. Both general methods are widely favored. However, it would appear that in recent years the track systems have been favored by architects and contractors principally because better alignment of the studs and a straight partition seem to be attained more easily; and because, in most instances, lower erection costs are obtained.

Requirements for Anchoring the Studs to Floor and Ceiling

(A) Concrete Floors, and Ceilings Plastered on Concrete— Permanent Partitions

(a) The hardness of the concrete sometimes affects choice of the method of erection. However, in new construction where concrete is fairly green and also where electrically or pneumatically driven chisels or drills are available, notching, as in *Figure 104,* is quite commonly used. Sometimes holes are cut for every fourth stud only and the lower ends of intermediate studs tied to a temporary horizontal alignment channel, placed near the floor, which is removed after the scratch coat has set.

(b) Where track systems, *Figures 105 to 115,* inclusive, are employed, their anchorage to the floor and ceiling masonry becomes a matter of importance. Hardened masonry nails are satisfactory if the concrete is strong and they are spaced not more than 18 inches on centers and are driven to a penetration of at least ⅝-inch. A better anchorage, which should be the minimum used where concrete is not dense, is provided if expansion drive bolts are used in combination with the nails, one drive bolt being provided every 3 feet and the nail omitted at that point. In factory partitions, etc., for rough usage, drive bolts should be used and spaced not to exceed 2 feet on centers.

(c) For any type of concrete the use of slotted, pronged or otherwise deformed floor and ceiling runners, or of stud shoes on ordinary channels is recommended for time-saving erection.

(B) Concrete Floors, Metal Lath Ceilings—Permanent Partitions

For anchoring the bottom of studs in this construction any of the foregoing details may be used. For the top of the partition, although some builders prefer a ceiling runner as in *Figure 106*, the construction shown at top of *Figures 105 and 107* is recommended as more economical.

(C) In Steel-Joisted or Beam Construction With Concrete Finished Floors—Permanent Partitions

Figures 107 and 108 show methods commonly used and found to be economical. Runner and stud-shoe systems shown in further detail in *Figures 111 to 115, incl.*, also are widely used for the attachment of studs to masonry floors of this type. For anchorage at top a ceiling runner attached to the underside of the Metal Lath Ceiling is desirable for alignment, but may be omitted as in *Figure 108*.

(D) For Clay Tile Floor Construction—Permanent Partitions

(See details in Figure 109.)

(E) Concrete Floors—Fireproof and Corridor Partitions

Where building codes do not permit partition to rest on wood and where 2-hour rated partitions for corridors, stairshafts, etc., are required, any of the details mentioned in the preceding *(excepting those showing wood floor runners)* are permissible.

(F) Concrete Floors, Removable Partitions: Wood and Steel Floor and Ceiling Runners

In the removable type of Solid Metal Lath Partition, wood floor and ceiling runners are used to facilitate removal of the partitions and relocating in another place. See details at bottom of *Figure 105; also Figure 110*. The wood ceiling runner, when used, is concealed by a cornice mold. The same method is also shown at the top of *Figure 108* where a steel joist floor system is illustrated.

Besides removability, another important advantage which makes the wood runner useful even where alteration possibilities are not important is that it provides excellent nailing for the wood base; and being two inches thick eliminates the need for plastering grounds. See also *Figure 128A*—Parkchester (Bronx, N. Y.) Development of the Metropolitan Life Insurance Company.

Attention is also called to the complete details of *Figure 110*. These also are economical, whether removability is desired or not.

Steel floor and ceiling runners used in conjunction with stud shoes have also been found satisfactory for partitions subject to change of location.

(G) For Better Sound Insulation

(Specification 1, Article J-c)

Where a higher degree of sound insulation is desired between rooms, architects should specify the channel studs to run all the way to the underside of the floor slab above, instead of stopping at the Metal Lath Ceiling, the partition to be plastered up to the floor slab as a cut-off of the space above the ceiling and also to reduce transmission by means of sound waves set up in the plastered ceiling. *See also Figure 183*. This detail is recommended for music studios, sound-film studios, etc.

(H) Attachment to Wood Floors and Joists

In *Figures 116 and 117* are shown details for erecting the channel studs in wood-joisted buildings. One of the speediest methods of erection is to drive two 8-penny nails into the floor where a stud is to be erected, slip the channel between and wrap a tie-wire around it and wire to the nails. Another simple scheme is to bend a 2½-inch shoe on the channel stud and drive a nail through it into the rough flooring or floor buck as the case may be; or a nail can be driven on each side of the shoe and bent over. More recently, slotted channel runners, nailed to wood floor runners as in *Figure 155*, or directly to the rough floor, have been widely used because of the superior alignment and anchorage thus provided for the studs. In fact, reference to the various track systems shown on pages 66 and 67, shows most are as readily applicable to wood floors as to concrete.

Single and Two-Piece Stud Systems

In erecting channel studs either one-piece single unit studs or two-piece studs spliced near the ceiling are used, depending on conditions at the building.

Saving in Erection Costs by Use of Single-Piece Studs Under Following Conditions:—

Single-piece studs, because they require no splicing and require handling of only one piece, save erection costs in many cases. They are recommended under the following conditions, the architect's attention being especially directed to the savings in partition erection when suspended ceilings are used as in *(a)* below:

(a) Where a Metal Lath Ceiling is used as shown in the upper part of *Figures 105, 106, 107*, etc., the upper ends of studs project into the space above the ceiling. This takes care of considerable variation in length. *(b)* Similar facilities for vertical adjustment are provided in hollow tile construction. *Figure 109*. This space also permits of expansion of the studs vertically to permit distortion of the partition in the event of fire. *(c)* Where concrete is fairly green and can be easily notched for ends of studs, and provided floor and ceiling are parallel within an inch. *(d)* Where special floor and ceiling-track systems with split channel studs *(Figure 113)*; or where stud shoes or special tracked metal base, *Figures 111, 114, 115*, are used.

Single-piece studs are not recommended for maximum erection economy in buildings where individual holes must be cut in concrete which has set hard and especially where there is considerable variation in distance between floor and ceiling slabs which requires separate cutting of each channel to length.

Two-Piece Studs Are Economical for Following Conditions:—

The advantage in the two-piece stud is that both parts of all studs can be cut the same length, the amount of lap between the upper and lower portions taking care of variations in the distance between floor and ceiling. However, there is extra labor for the wire ties at laps which are not used for 1-piece studs. The *"two-piece method"* is recommended specifically:

Where studs run from floor to ceiling slab and where the distance between floor and ceiling may vary more than 1-inch, and the use of special track runners or stud shoes, which will absorb such variations, is not available.

No Need for Bolting Individual Studs to Floors or Ceilings

Metal Lath and Plaster Partitions depend less upon the manner in which the metal is attached together than upon the plaster which cements the partition and gives it the necessary rigidity when set. This is perfectly apparent from the number of successful details shown in the following pages for attaching channel studs to floors and ceilings and in which bolting of the individual studs is not at all necessary. Architects are urged for economy's sake to embody these details in their specifications. *(See also* CHAPTER XXIV — *Specifications.)*

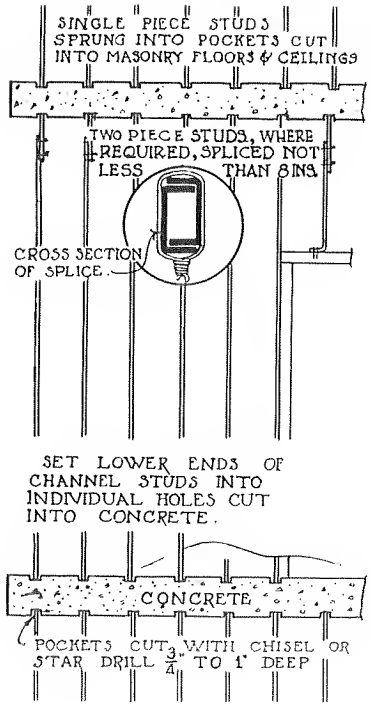


Fig. 104. Anchorage in flat slab concrete floors and ceilings using notching method.

Whenever Masonry Nails are specified, Expansion Drive Bolts or equivalent attachments may be used.

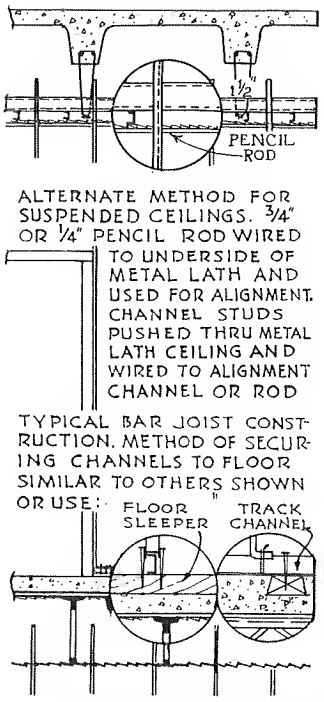


Fig. 107. (ABOVE) Upper ends of studs pushed through holes in ceiling lath and tied to alignment channel.

(BELOW) Attachment of lower ends of studs to wood floor runners on masonry slab.

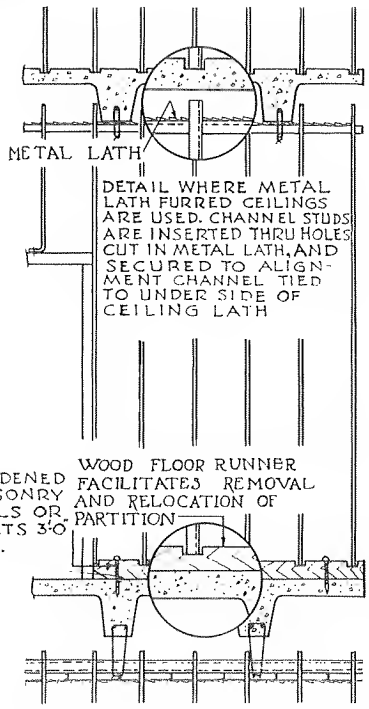


Fig. 105. (ABOVE) Upper ends of studs secured to furred Metal Lath Ceiling under concrete joists.

(BELOW) Lower stud ends secured to wood floor runner for attachment of wood base.

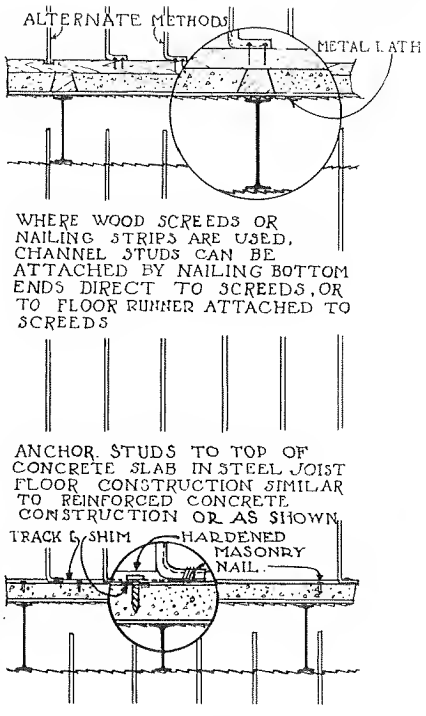


Fig. 108. (ABOVE) Studs pushed through holes cut in ceiling lath; alignment channel omitted.

(BELOW) Lower ends of studs attached to track channels nailed to concrete floor.

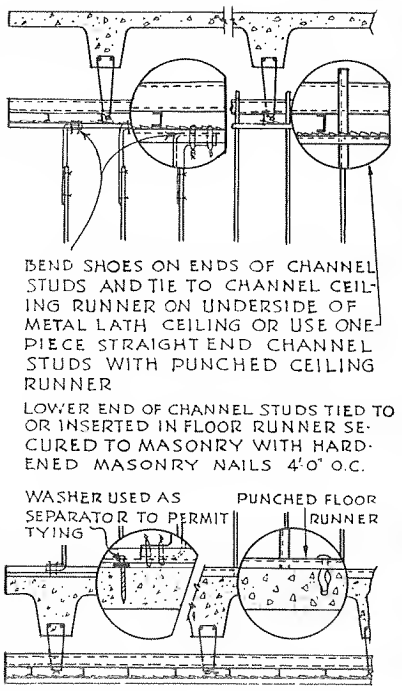


Fig. 106. (ABOVE) Upper ends of studs secured to suspended Metal Lath Ceiling; masonry floor.

(BELOW) Lower ends secured to metal channel floor runner on masonry floor.

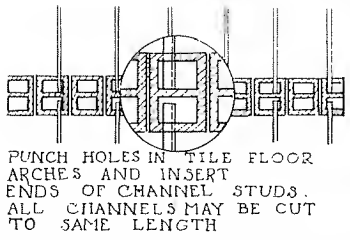


Fig. 109. Top and bottom ends of studs secured to structural tile floor without use of runners.

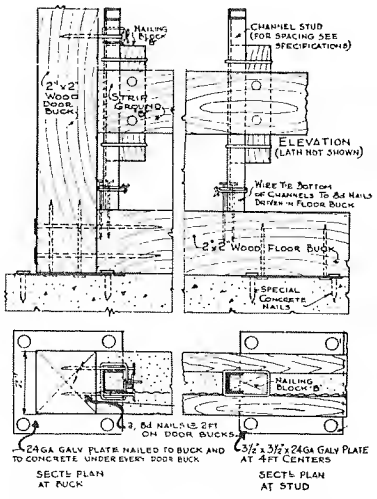


Fig. 110. Studs secured to wood floor buck nailed to concrete floor. Wood buck facilitates movability; provides grounds.

Stud Anchorage and Erection Standard Details

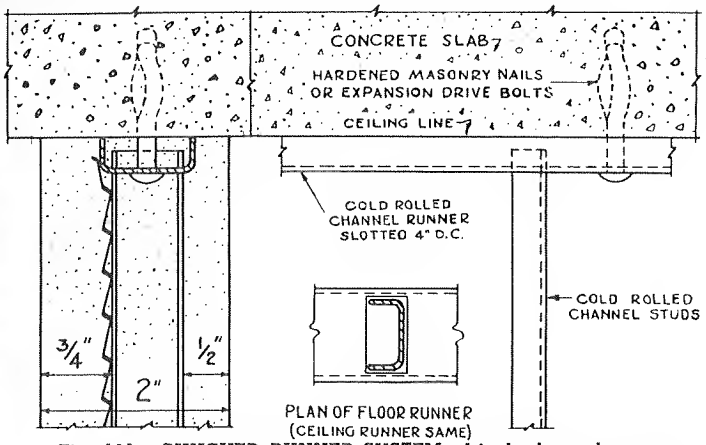


Fig. 111. PUNCHED RUNNER SYSTEM—1-inch channel runners are attached to floor and ceiling with masonry nails or other anchors. Runners have slots punched every 4 inches to receive channel studs, spacing of studs depending on type and weight of Metal Lath used. Studs are dropped into slot in floor runner and slipped into slot in ceiling runner.

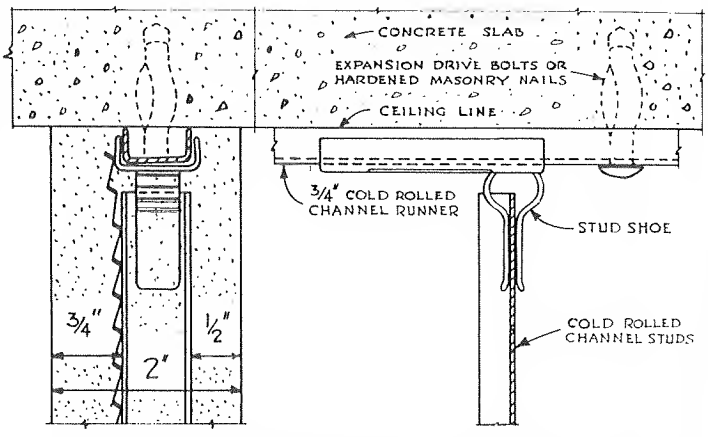


Fig. 112. STUD SHOE SYSTEM—¾-inch channel runners are attached to floor and ceiling with Rawl Drives. Special stud shoes clamp with a driving fit onto runners, and are placed to correspond with stud spacing. Studs are slipped into floor shoes or clips and top end then sprung into position in ceiling clips.

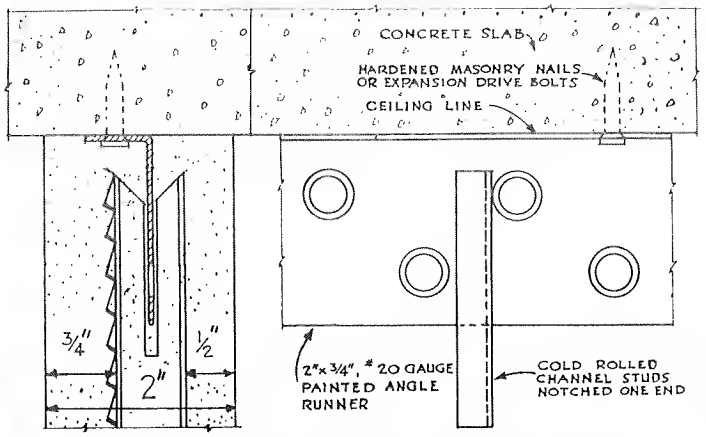


Fig. 113-A. ANGLE CEILING RUNNER—2-inch by ¾-inch angle runners are attached to ceiling with masonry nails or equivalent anchors. Channel studs are notched and slotted at one end. Studs are placed by slipping slotted end upward onto downstanding leg of angle runner and dropping down into crimped floor runner as in Fig. 113-B at right. Burrs on holes prevent tipping of channels.

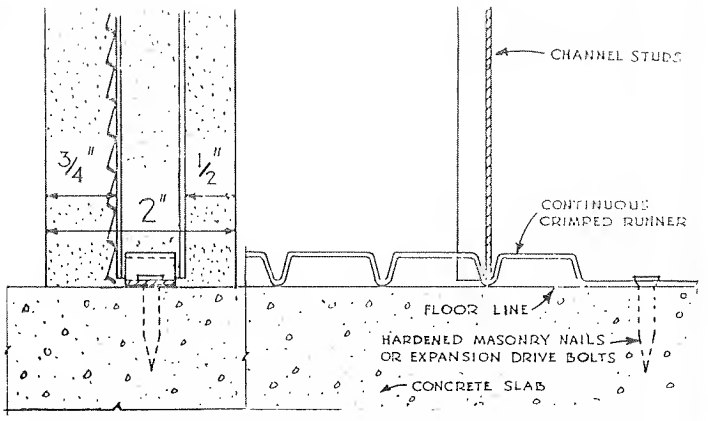


Fig. 113-B. CRIMPED FLOOR RUNNER—18-gauge continuous crimped runners are attached to floor with masonry nails or equivalent anchors. Grooves in runner provide slot into which ¾-inch channel studs are dropped. Top ends are secured as shown in Fig. 113-A at left.

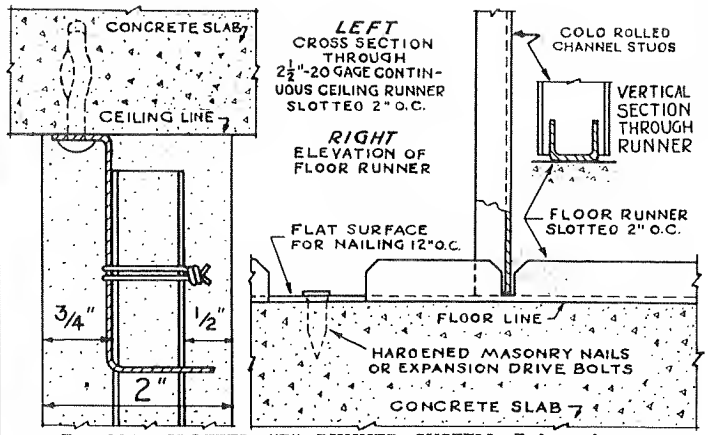


Fig. 114. SLOTTED "Z" RUNNER SYSTEM—Z-shaped runners for ceiling have ½-inch nailing flange and 1⅛-inch horizontal flange with openings punched for channel studs. Floor runners are channel-shaped, with upstanding flanges slotted. Studs are first slipped into ceiling runner, and then dropped into floor runner.

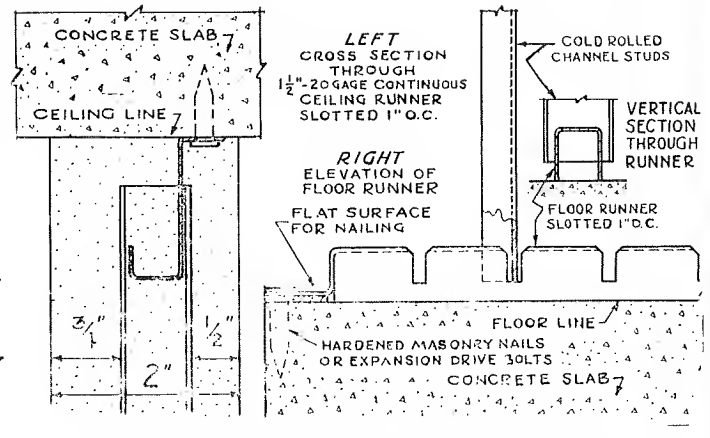


Fig. 115. SLOTTED AND PERFORATED RUNNER SYSTEM—S-shaped runners for ceiling have ½-inch nailing flange and ½-inch horizontal flange with upturned edge both slotted for channel studs. Floor runners are U-shaped with flanges down and web and flanges slotted. Studs are first slipped into ceiling runner and then dropped into floor runner.

Special and Patented Types of Stud Anchorage (Manufacturers' Names on Request)

4. Size, Weight and Placing of Channel Studs for Solid Partitions of Various Heights and Thicknesses

(See Also Specification 1, Article B)

Well over 90% of all partitions are under 12 feet clear in height; and for these the standard ¾-inch cold-rolled channels weighing 276 pounds per thousand feet used in 2-Inch Solid Plaster Partitions are found amply strong and rigid. If a ¾-inch channel weighing 332 pounds per thousand feet is used, the 2-inch thickness may be used for 14 foot heights, although the 2¼-inch thickness is probably more satisfactory. Furthermore, for heights of 12 to 16 feet the partitions can also be built with 1-inch cold-rolled channels, but in this case they should be 2¼ inches thick. Both ¾ and 1-inch channel studs are widely available.

Sizes and weights of channels recommended for various heights and thicknesses of Solid Metal Lath Partitions are given in TABLE I.

Although numerous instances are on record where 2-Inch Partitions over 20 feet in height have been built with ¾-inch channels, it will be found advisable for speed of erection and to simplify bracing to use larger and stiffer channels when carrying partitions to such heights; the thickness of partition is also usually increased.

Cold-Rolled vs. Hot-Rolled Channels

Either cold or hot-rolled channels may be used for studs, but in most localities cold-rolled channels are preferred, because they weigh less, are easier to handle, and can be more readily bent to form or cut to length. Cold-rolled channels of an equal size can be used for most positions in place of hot-rolled channels.

TABLE I—Sizes of Cold-Rolled Channel Studs and Thicknesses of Partitions for Various Heights of Solid Metal Lath Partitions

Height not to exceed	Thickness of Partition	Size and Nom. Weight per ft. of Channels
12 ft.	2 in.	¾-in. .276 lb.
14 ft.	2 in.	¾-in. .332 lb.
14 ft.	2¼ in.	¾-in. .276 lb.
16 ft.	2¼ in.	1-in. .332 lb.
18 ft.	2½ in.	1-in. .332 lb.
20 ft.	2¾ in.	1-in. .332 lb.
†24 ft.	3 in.	1½-in. .442 lb.
†30 ft.	3½ in.	1½-in. .442 lb.

NOTE: No limitations on length of these partitions for heights under 12 feet. Length, between columns, walls or other vertical structural members, shall not be greater than two times the partition height when the latter is 12 feet or more, nor greater than one and one-half times the height when the latter exceeds 16 feet; nor greater than the height when it is 30 feet or more. For lengths exceeding these, thickness shall be increased 20%.

†For heights over 20-ft. furnish horizontal cold-rolled channel or rod stiffeners on channel side of partition every 6 ft. vertically.

Channel Studs Are Placed Slightly Off Center of Partitions in 2-Inch Partitions

A glance at *Figure 103* shows that the three-quarter inch channel studs are placed ⅛-inch off center in 2-Inch Solid Metal Lath and Plaster Partitions.

This provides ¾-inch of plaster on the lath side of the partition. The other side of the Channel at the extreme point is covered about one-half inch, but the lath on this side is so fully embedded with 1¼ inches of plaster that the construction is extremely well devised for greatest rigidity and permanence.

Because of thus off-setting the studs it is well to bear this in mind when setting floor and ceiling track runners, and when drilling holes for them in floor runners and elsewhere. For thicker solid partitions the studs are placed on the center line.

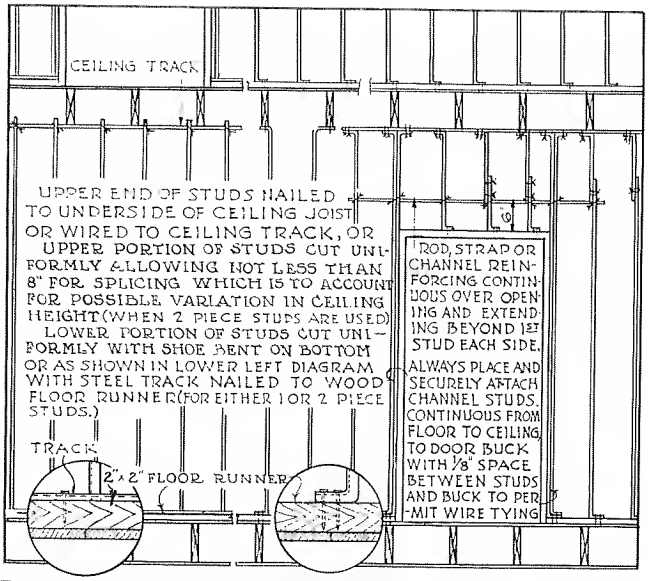


Fig. 116. Solid Partitions in Wood-Joisted Building; Ceiling Joists PERPENDICULAR to Partition.

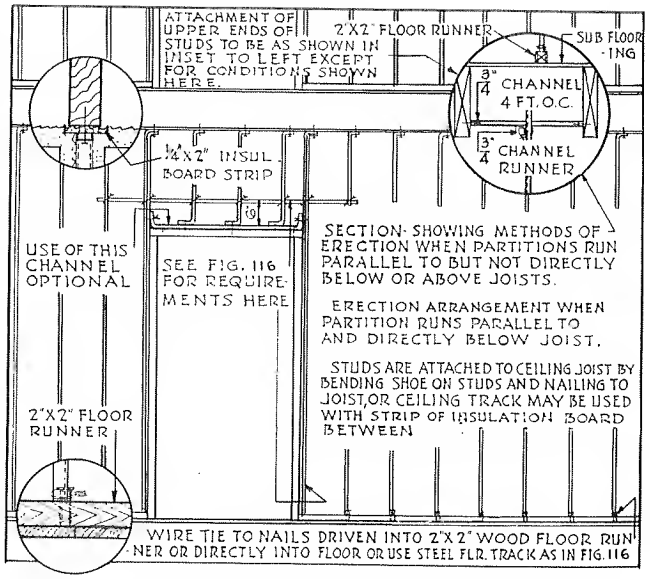


Fig. 117. Solid Partitions in Wood-Joisted Building; Ceiling Joists PARALLEL to Partition.

5. Spacing of Channel Studs for Solid Metal Lath Partitions

(Specification 1, Article A)

It is generally accepted that where the Metal Lath is fully embedded as in solid plaster partitions that the lath is primarily a vehicle for the application of the plaster until it has set. The studs in conjunction with the solid plaster possess all necessary rigidity and strength as non-bearing partitions, the lath being valuable additional reinforcement to prevent plaster cracks. Hence, the distance between channels is governed by the stiffness of the lath necessary to facilitate plastering. When the lath gives too much under the trowel the work of the plasterer is slowed up. But it is also possible to place channels so close together that they will add unnecessarily to the expense both for materials and erection.

Based on results of Trowel-pressure deflection tests of Metal Lath with various distances between supports, coupled with the experience of lathers and plasterers, *Table II*, comprising recommended spacings of Metal Studs for Solid Metal Lath and Plaster Partitions, has been compiled.

Lath should be specified by weight per square yard in accordance with the spacing of supports as given in the table. Weights are exclusive of paper or other backing.

TABLE II—Weights of Metal Lath and Corresponding Spacings for Channel Studs, Solid Partitions

TYPE OF LATH	Weight, Lbs. per Sq. Yd.	Spacing of Supports, Inches
Flat Expanded Lath	2.2	12
	2.5	16
	3.0	16
	3.4	16
Flat Rib Lath	2.75	16
	3.0	19
	3.4	24x
	4.0	24x
⅜" Rib Lath or Lath of Equal Rigidity	3.0	24x
	3.4	31½z
	4.0	31½z
Sheet Lath	4.5	24

x These spacings permissible for Solid Partitions not exceeding 16 ft. in height. For greater heights, permanent horizontal stiffener channels or rods must be provided on channel side of partitions, every 6 feet vertically, or else these spacings should be reduced 25%.

z These spacings permissible for Solid Partitions not exceeding 12 ft. in height. For greater heights, permanent horizontal stiffener channels or rods must be provided on channel side of partition every 6 feet vertically, or else these spacings should be reduced 25%.

6. Recommended Types of Metal Lath for Various Partitions

Experienced plastering and lathing contractors know the spacings necessary to secure greatest economy for the completed job and hence should be given discretion as to which combination of lath and spacings to use, but the spacings should not exceed those given in *Table II*.

However, for 2-Inch Sold Metal Lath Partitions best results and greatest economy are obtained using open mesh laths which permit heavy plaster keys to be readily formed on the back side of the scratch coat thus reducing the amount of plaster and labor necessary for the application of the backing-up and succeeding coats.

7. Temporary Bracing and Aligning of Metal Studs

(Specification 1, Article A-f)

Solid Metal Lath Partitions, after studs are in position, are temporarily braced in order to insure a stiff, straight wall for the correct application of lath, grounds, conduits, and plaster.

This brace is very simple and easily applied. Uusually it is a ¾-inch Channel placed horizontally midway between floor and ceiling and wire tied to each of the studs. *(See Figures 119 and 123)*. If the distance from floor to ceiling is more than 12 feet, additional braces are supplied so that the distance between does not exceed 6 feet. The brace is kept in place until after the scratch coat of plaster on the lath side has set when it is permanently removed to permit placing the backing-up coat on the channel side. On long or high partitions additional bracing diagonally from the floor or ceiling to the horizontal bracing is provided.

Where Solid Partitions are thicker than 2½ inches, it is frequently more economical and makes a stronger wall to permanently embed the horizontal bracing.

Many plasterers prefer other types of bracing. Wood is quite frequently used, 2 x 4's displacing the ¾-inch channels previously described, a typical method being shown in *Figure 102*. Where space for diagonal braces is scarce, vertical braces, *Figure 118*, are recommended.

Where unsanded or lightly sanded gypsum plasters are used, 2x4-inch horizontal bracing stiffened as in *Figure 118*, is recommended to prevent warping; it should not be removed until the backing-up coat, and the brown coat on the lath side have set.

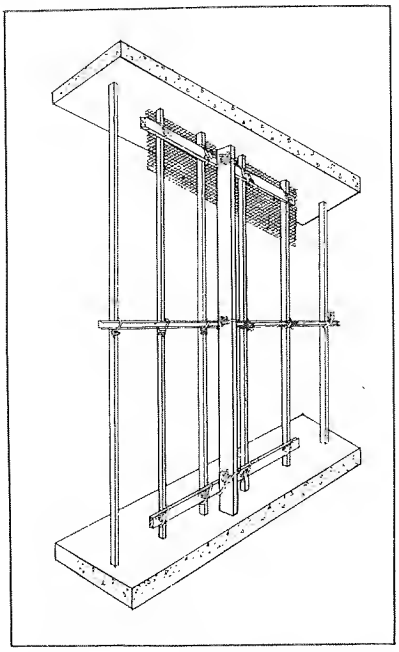


Fig. 118. Temporary Bracing Using Vertical Wood Stiffener To Provide Cleared Working Space.

CHAPTER XIV

Installation of Electrical Devices, Etc.

(See also CHAPTER XIX — Installation of Piping and Plumbing Fixtures)

1. Electrical Products Manufacturers Now Provide Complete Line of Devices for 2-Inch Partitions

Manufacturers of electrical devices and fittings of all kinds now regularly supply a complete line of electrical switches, convenience outlets, receptacles, and fixture outlets and boxes which can be concealed in the thickness of the partitions. Switches are only 1-inch deep and boxes 1½ inches. This eliminates a difficulty which architects had heretofore experienced. *(See Appendix for list of manufacturers.)*

Dealers of electrical equipment in nearly every city carry a complete line of these shallow electrical devices, and will gladly cooperate when requested by architects and builders who should be sure to specify shallow devices, etc., to assure satisfactory electrical installations.

Metal Lath Simplifies Electrical Installations

The very nature of the open mesh of Metal Lath permits an unobstructed view of both sides of the partition, conduit, etc., simultaneously. Electrical installations in Metal Lath Partitions require no tedious cutting away of masonry for installation of conduit, as in block and tile partitions. These points make the use of Metal Lath construction, with its many opportunities for attaching fixtures securely either to the lath or studding, particularly advantageous from the standpoint of cost of electrical installation.

Note that continuous "chasing" or channeling of block partitions robs them of part of their structural stability, and slots so channeled must be covered with Metal Lath stripping to permit the plastering to be completed. Such patching is a considerable item of expense. *(See* CHAPTER IV.*)*

2. Installation of Conduit and Cable

The stub ends of conduit placed in floors, for running into the partition later, are "spotted" accurately in the concrete floor forms, instead of haphazardly, bringing the conduit well within the confines of the solid partition, and as a result installations are equally as rapid as in other types of construction. A "hickey" *(a gas pipe bender for conduits)* used on the stub end

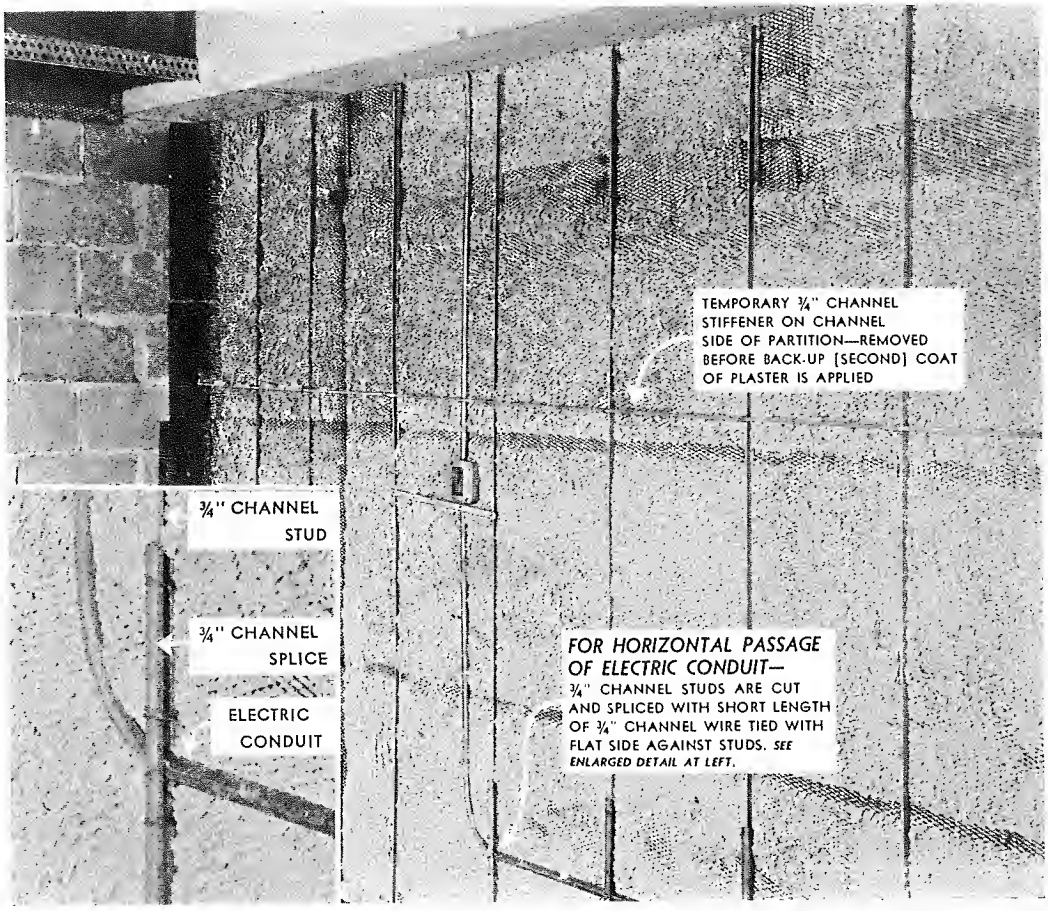


Fig. 119-A. Method of cutting and splicing channel studs for horizontal runs of circular rigid conduit.

Photos Courtesy USHA.

of a floor or ceiling riser not properly located will quickly bring it to the center of the partition by a general ogee bend.

Round and oval-shaped rigid conduit are both generally available, the latter being commonly used where space does not permit use of the larger round conduit. *(Figure 119-B.)*

Installation of conduit is the next step after placing the Channel Studs and bracing them, and before lath is applied, so that the conduit is usually wired to a temporary cross piece between the channels on either side. *It is not necessary to place it up against a stud, as the metal lath reinforced plaster embraces the conduit all around in a permanent grip wherever located in the partition.* Not only is the partition not weakened by the conduit, but the latter actually adds so much reinforcement to the construction.

Flexible cable has inherent installation advantages over other types, particularly where space is at a premium. Its use is common in many localities, and is gaining acceptance in others. The authorities of New York City authorize its use in Solid Metal Lath Partitions provided it is lead-covered.

Flexible cable is ordinarily tied where it crosses the channel studs or to the temporary partition bracing, and the box to which it is connected is also usually tied to the construction.

Switch boxes and convenience outlets are placed at the same time but are not firmly attached until lath is applied, when they are wired to it, or channels, so that the face of the outlet is properly located with respect to the finished plaster surface.

For convenience, electrical workers tie the box to the lath if it is in place; and one manufacturer has provided a box with lugs on it for this purpose, as shown in dotted lines at the top of *Figure 120. It is recommended always that when installed on the lath side of the partition, for which it is necessary to cut a hole in the lath, that a small piece of Metal Lath be wired to the back side of the box to provide a good bond for the plaster.* See *Figure 120, Diagram 1*, upper and right-hand details.

3. Horizontal Conduit Runs in 2-Inch Metal Lath Partitions

When running electrical service horizontally through the partition there is lack of depth to permit running circular rigid conduit over the face of channel studs except in partitions 2½-inches thick, or more. However, this situation is easily handled in 2-Inch Solid Metal Lath Partitions by cutting and splicing the studs as shown in *Figure 119-A*. This is common practice in electrical installations.

Oval Conduit

Use of oval shaped rigid conduit is also recommended for this purpose. The material is generally permitted by building code regulations since it is approved by the National Board of Fire Underwriters.

Oval conduit, with its small out-to-out dimension of only 7/16-inch, has the further advantage that it can be embodied entirely in 2-Inch Solid Plaster Partitions on either the channel or the lath side, and run either vertically as customary, or horizontally, without requiring cutting or splicing of the studs. *(See Figure 119-B.)* However, when run on the channel side the thickness of the partition may need to be increased slightly to provide adequate plaster coverage.

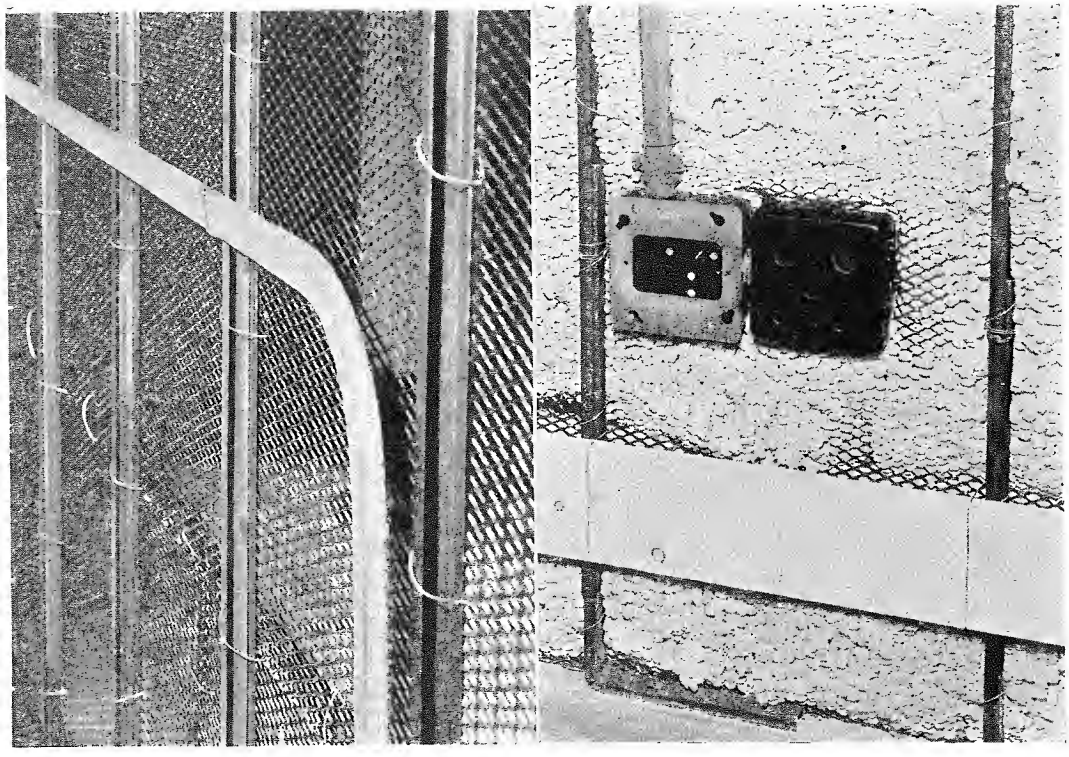
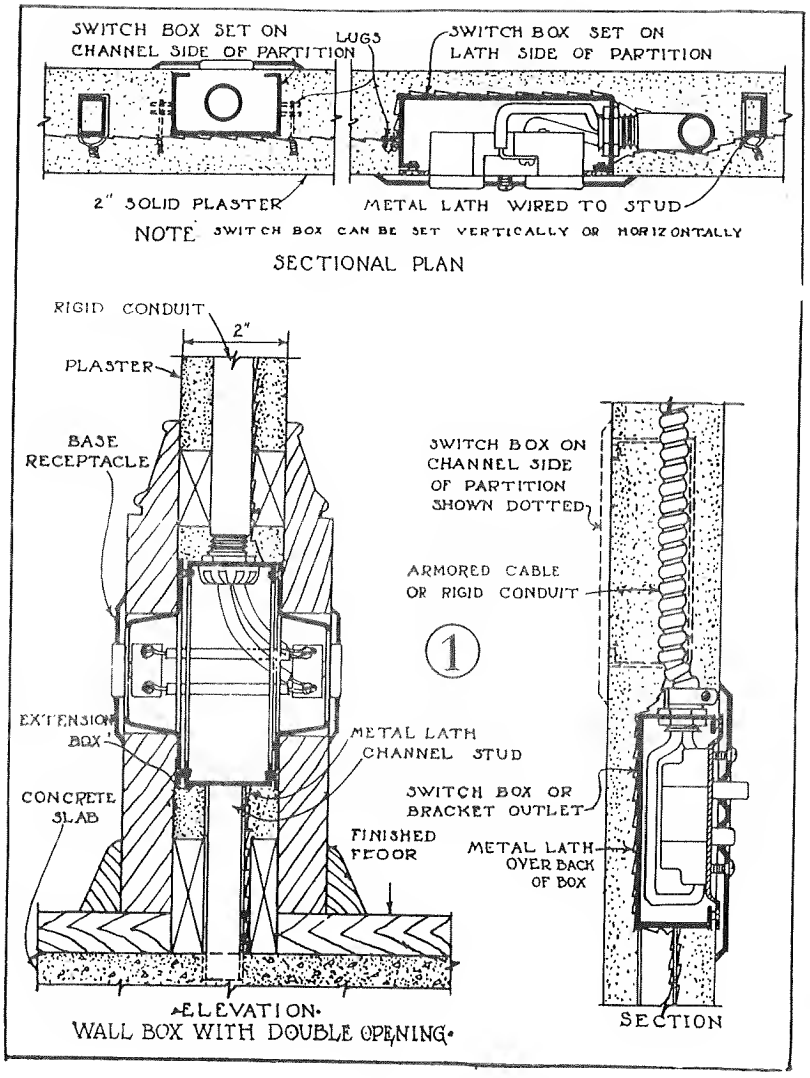
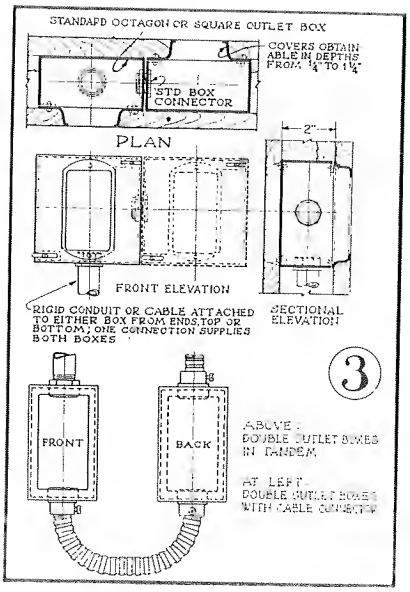
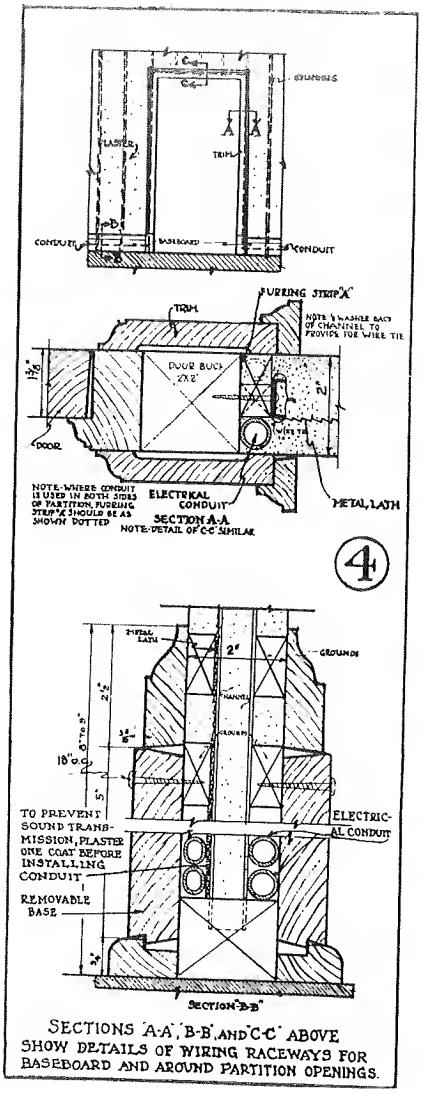


Fig. 119-B. Three-eighths inch oval-shaped rigid conduit simplifies horizontal run on either side of partition without cutting studs. This conduit is as easily curved as the round type.

Fig. 119-C. To serve adjoining rooms with one conduit, two regular outlet boxes 1⅜-inch deep facing in opposite directions and with a connector between are placed side by side. Back of box is covered with Metal Lath to provide plaster key.







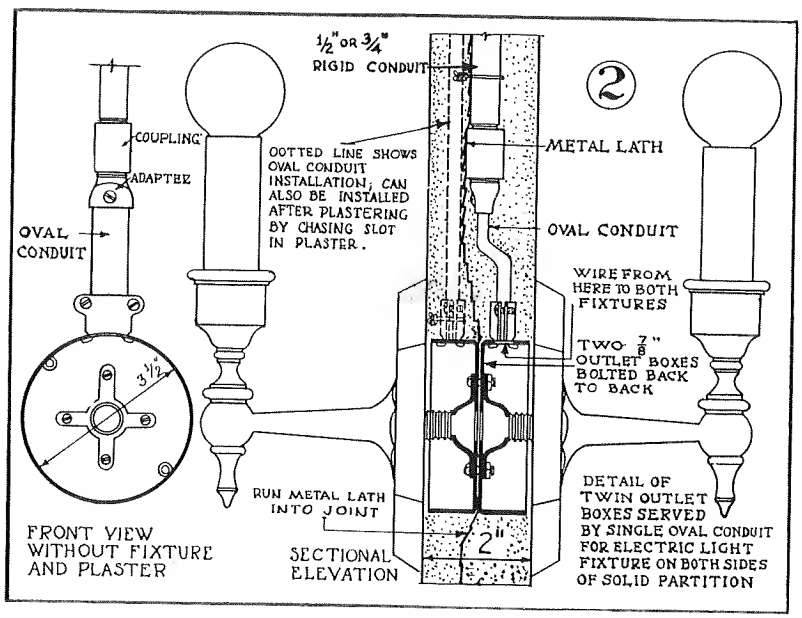


Fig. 120. Typical Electrical Installation Details for Solid Metal Lath and Plaster Partitions (SEE TEXT FOR FULL DESCRIPTION).

4. Installation of Outlets

Electrical Installation for Outlet On One Side of Partition Only

The upper and right hand details in *Diagram 1, Figure 120*, show typical installations of a standard shallow outlet for a switch box, convenience outlet, or light fixture on one side of partition only.

The boxes are only 1½ inches deep over all, permitting ample plaster coverage on the back side. The switches and devices designed with a maximum depth of one inch provide adequate facilities for wiring. The box can be readily installed on either side of partition to come flush with the plaster.

Single Conduit Serves Multiple Outlets for Single or Adjoining Rooms

Where a series of convenience outlets are to be placed side by side in a partition, manufacturers have provided boxes permitting the devices to be "*ganged*" so that a single conduit will serve all.

For economy and ease in wiring, it is frequently desirable to place fixtures back to back, or side by side, to serve rooms which adjoin so that a single conduit (instead of two) will be required.

Where outlets are located in the baseboard, a number of installation methods are available; one of the neatest and least expensive types is shown in the lower left hand corner of *Diagram 1, Figure 120*. It consists of an extension box or ring without back, placed approximately in the center of the partition with cover plates on each side to bring it out flush with the plaster or trim as desired. As indicated in the diagram a single conduit supplies the outlets to both sides. The cover plates are obtainable in various depths to suit conditions. The detail of *Figure 120, Diagram 1*, is not, however, designed for light fixtures such as wall brackets, etc. (To prevent sound conduction through the box it should be stuffed with a mineral wool or similar incombustible flexible sound insulating material.)

Figure 120, Diagram 3, upper detail, shows another simple and inexpensive method developed for this purpose. Two boxes of equal size are placed side by side fronting in opposite directions and coupled with a standard box connector. A single conduit directly connected to one supplies both. A typical installation is shown in *Figure 119C*. Cover plates should be ordered for the thickness of construction at outlet.

A variation of the above, with cable connecting the two boxes, is shown in *Figure 120, Diagram 3*, lower detail.

5. Shallow Boxes for Oval Conduit

A type of shallow circular box for oval-shaped conduit or armored cable which is especially adapted for use in 2-Inch Solid Plaster Partitions where depth is at a premium and where economy dictates the use of only single conduit is shown in *Diagram 2, Figure 120*.

Note that standard ½ or ¾-inch rigid circular conduit is run nearly to the box and from there by means of a coupling and lock-nut is connected to the oval duct which is in turn run to the nearest box of the pair. These are circular, placed back-to-back, and have openings in the backs so that wire can be drawn from one box to the other, permitting one duct to supply both boxes. Because of their shallowness these boxes can be used only for lighting fixtures.

6. Installations of Ducts, Piping, etc., Greater than 1-Inch Outside Diameter

Two-Inch Solid Metal Lath Partitions are not intended for use where conduits, piping, ducts, etc., exceeding 1-inch in outside diameter are to be contained flush within the partition. A minimum coverage of ½-inch of plaster is required and it is therefore urged where piping of greater diameter is to be accommodated, that either thicker Solid Partitions, or preferably Hollow or Double Metal Lath Partitions be used.

Ordinarily, because the cost of the Solid Partition is less than the hollow type, it is preferred. However, due to the considerable increase in cost when the Solid Partition exceeds 2½ inches in thickness, it is recommended that if greater thickness is necessary to obtain the half-inch plaster coverage required over piping, etc., that the Hollow or Double Partition be used. *(See Figures 158 and 159.)*

7. Construction Details for Wiring Raceways, etc.

In buildings, such as offices, in which changes in occupancy are more or less frequent, it is highly desirable to provide some convenient means for varying the wiring arrangements from time to time. The newly perfected "plug-in" continuous device shown in *Figure 121* is designed for that purpose.

The raceway detail shown in *Diagram 4, Figure 120* has been developed to show removable baseboard in connection with both light and telephone circuits and method of carrying the wires over door openings. The raceways permit tapping the service wiring at various points without cutting into the construction or providing new conduit.

Metal Base for Conduit

Where metal trim is used it is frequently desirable to use metal raceways for wiring to serve the same purpose as that described in the preceding. A type is made especially for shallow-type receptacles and is readily installed in Solid Metal Lath and Plaster Partitions.

See Appendix for names of manufacturers.

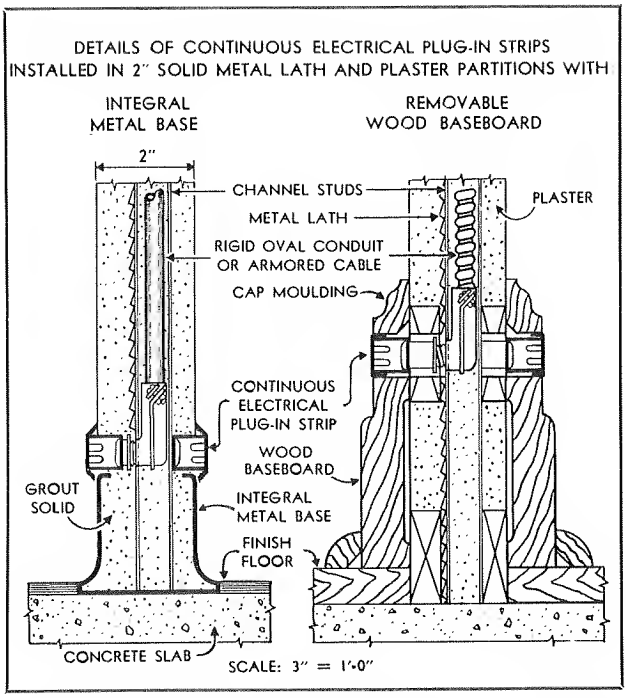


Fig. 121. Methods for Varying Electrical Wiring Arrangements Without Construction Alterations.

CHAPTER XV
Application of Metal Lath

(See Also CHAPTER XX — Deep-Rib Lath)

1. Lathing Should Begin at Top of Partition

(Specification 1, Article D)

With conduit and service piping in place, the partition is ready for the application of Metal Lath.

It is best to start lathing at the top of the partition. By starting at top any special cutting of Metal Lath Sheets to width will be left for the portion near the floor where it is more easily done than on the scaffold. Secondly, to facilitate plastering, the upper edge of the lower sheet should preferably lap over the lower edge of the upper — and this is most easily accomplished by applying the first sheet at the top of the partition. Furthermore, as scaffolding is necessary for attachment of upper end of studs to ceilings, it will be available for application of lath at top, after which the scaffold can be moved to work elsewhere to permit finishing the bottom lathing.

2. Details of Application of Lath

For Solid Partitions, only one Metal Lath surface is used. The lath is placed on the face of the channel which has been set back as explained in CHAPTER XIII, *Article 4*. Sheets are applied to one side only of the channels with the long dimension of sheet across the studs and with ends of sheets staggered one above another. As already noted, lathing is begun at the top of the partitions and carried down with the upper edge of the lower sheets lapping over the lower edges of the upper sheets.

Corner Laps and Corner Strips

Where the ceiling is plastered directly on concrete or tile, and in general if Metal Lath is not used on the ceiling, a 4-inch corner lap or shoe is bent on the upper edge of the top sheet and attached to the ceiling with masonry stub nails so that no joints occur at juncture of ceiling and partition. Similarly, all lath should be started one stud away from corner and be bent into the angle and carried on to the abutting wall to avoid a joint at juncture of walls. However, where a rib-stiffened or sheet lath is used on partitions, instead of bending it, the end is butted into the corner against the ceiling lath and adjoining walls, and corner strips are used to reinforce the joints. These, called "Cornerite" are of flat lath 6 inches wide bent into the shape of an "L" making each leg 3 inches wide and securely wired along each edge in all corners. Cornerite should not be fastened at the corner, but only along each edge of the sheet.

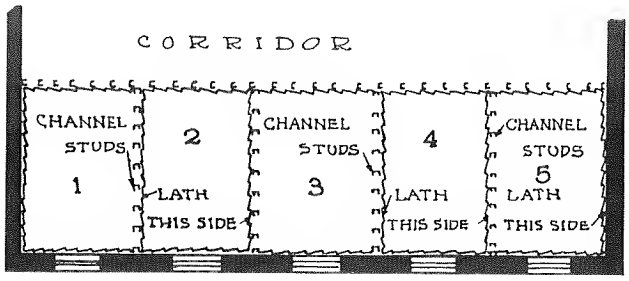
Wire Ties and Lapping of Sheets

Sheets are attached to Metal Studs at 6-inch intervals by means of No. 18 gauge galvanized annealed wire, or by suitable clips. Because these partitions are back-plastered, the side ties at edge laps of sheets, necessary on other types of Metal Lath Partitions, may be omitted, particularly when studs are closely spaced.

Flat expanded Metal Lath should be lapped at sides not less than ½-inch and at ends not less than 1-inch. End laps of sheets should generally occur only over studs; if between studs, the laps should be securely laced with tie wire. Rib and sheet laths are lapped at sides by nesting outside ribs or selvage. At ends, rib-lath is lapped 1-inch. End lapping of sheet-laths is done by lapping one series of loops and nesting tops and bottoms of loops of lapping sheets.

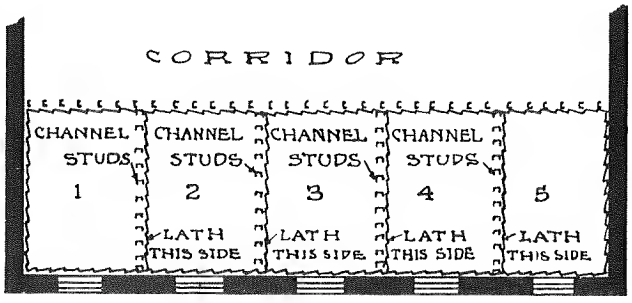
Proper Choice of Side of Channels on Which to Apply Lath in Series of Adjoining Rooms, Expedites Plastering and Reduces Costs

As lath is applied on one side only of channels in solid partitions the lather can frequently aid materially in expediting plastering and reducing costs by applying the lath on that side of the channels which makes it possible to apply the plaster on all four walls before the scaffolding is moved to other rooms. *(See Figures 122 and 122-A.)*



RIGHT METHOD — Fig. 122

NOTE: Metal Lath should be applied on side of channel studs to permit simultaneous application of scratch coat on all walls in Rooms 2 and 4 before moving scaffold. Plastering on all walls in Rooms 1, 3 and 5 can then be completed in same order after scratch coats in Rooms 2 and 4 are set. For same reason lath along corridor partition may be placed on alternate sides for adjoining rooms.



WRONG METHOD — Fig. 122-A

NOTE: When lathing is applied as above, scratch coat of plastering in Rooms 1, 2, 3, etc., cannot be completed simultaneously on all walls in any one room before moving scaffold to next room, because the lath between Rooms 1 and 2, 2 and 3, 3 and 4, etc., is on the same side of channels. When lathed in this manner, one partition always lags one coat behind the others.

CHAPTER XVI

Grounds for Plastering, Trim, Wood, Cement and Terrazzo Base

(See CHAPTER XVII for Metal Base)

(See Specification I, Articles F, H)

Grounds are employed either for the attachment of trim, or as alignment and thickness guides for the plasterer, as screeds, or for both purposes.

The many facilities offered by Metal Lath and Channel Partitions for the satisfactory attachment of all kinds of grounds and trim to them constitutes an important advantage in the use of this type of construction. It is not necessary to drill or plug holes, use shims which usually split, or toggle-bolts or other laborious and expensive devices for attaching grounds. The attachment of grounds to the channel studs stays firm and rigid and the relatively inexperienced carpenter quickly becomes adept in the simple methods used. The cost of application, therefore, is usually considerably less than for other partitions.

1. Strip Grounds

Perhaps the most commonly used ground for Metal Lath Partitions consists of a continuous horizontal wood strip from ½ to ¾-inch thick and 1⅝ inches wide, placed over the lath on the lath side and secured by nails or wire ties through the partition to a companion strip placed against the channels on the opposite side.

As the studs are usually off center in the 2-Inch Partition, the thickness of the grounds on the lath side will be about ⅝ or ¾-inch *(depending on the thickness of the Metal Lath)* and on the channel side about ½-inch. In 2¼-inch and thicker partitions the studs are usually placed so that the same thickness of grounds is used both sides.

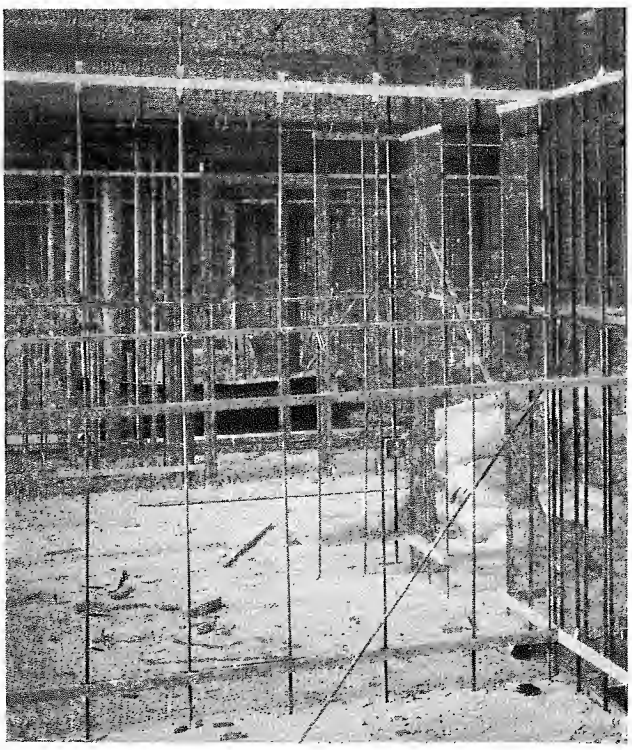


Fig. 123 Grounds for Picture Mold, See Detail, Fig. 124-B; Grounds for Base-Board, See Detail, Fig. 124-C.

These grounds finish flush with the door bucks at openings and with wood floor runners when used. Such grounds are placed on each side of the partition at heights to take care of baseboard, chair rail, cornice mold, etc., as shown in *Figure 123;* and for closet shelves as in *Figure 137.* Strip grounds are also shown in detail in Diagrams 1 and 4 of *Figure 120,* and in *Figures 146, 152* and *153.*

See also ground detail in CHAPTER XXVI for attachment of steel kitchen cabinets.

Attaching Grounds to Partition

Strip grounds are sometimes merely tied to the channel studs, as in *Figure 124A.* Tying will give entirely satisfactory results if care has been exercised in aligning the latter when bracing during erection, or if the studs are secured to floor and ceiling track runners by some of the methods of CHAPTER XIII, which insure alignment. Where needed, alignment of the grounds can be improved by small wood wedges.

However, a better method and the one now most commonly used is that shown in *Figure 124B.* Short nailing blocks to correspond with width of channel, 1-inch wide and 2 or 3 inches long, are used between the strip grounds on either side, and the channel. These blocks are nailed to the channels before erection or clipped to the studs after erection. The grounds are nailed to these blocks by two carpenters, one on each side of the partition, backing each others' blows, the nails being driven from one strip ground through the block into the other ground, then clinched. Where an especially good job is wanted, small wedges are used for alignment (as shown in *Figures 123 and 124B*) between the strips and the channels or blocks. A fairly satisfactory job is also obtained with the blocks used only every second or third channel.

One of several successful nailing block methods developed on the Pacific Coast and used in a large number of buildings is shown in *Figure 127.* The block is firmly secured to the channel by a special clip of galvanized wire pointed at both ends and applied with a set of pliers, devised for this purpose.

Three-Piece Strip Grounds

For the attachment of heavy trim or fixtures, the three-piece ground shown in *Figure 124C* is recommended. Instead of a nailing block, a continuous wood strip or block with thickness the same as depth of channel is cut between the studs.

Intermittent Strip Grounds

For certain types of trim and also where an especially thin Solid Partition is wanted, grounds of the intermittent type are used. These are short strips cut in and set between the channels as shown in *Figure 126* and staggered between alternate channels in order to permit nailing into the end of the ground.

2. Wood Floor Runners Serve Many Purposes

Wood floor runners 2 inches wide and 2, 3 or 4 inches high are commonly used to provide: *(1)* a means for securing and aligning the lower ends of channel studs; *(2)* a ground for the plasterer to work to; *(3)* a nailing base for the subsequent attachment of wood or metal trim, *(See Figure 137)* and, *(4)* as a means of simplifying removability when the partition is to be relocated. Sometimes 2 x 2-inch floor runners are used in combination with strip grounds as in *Figures 110, 146 and 152.* In other instances the floor runner is made out of 4 or 6-inch stock to provide both top and bottom nailing for the base boards.

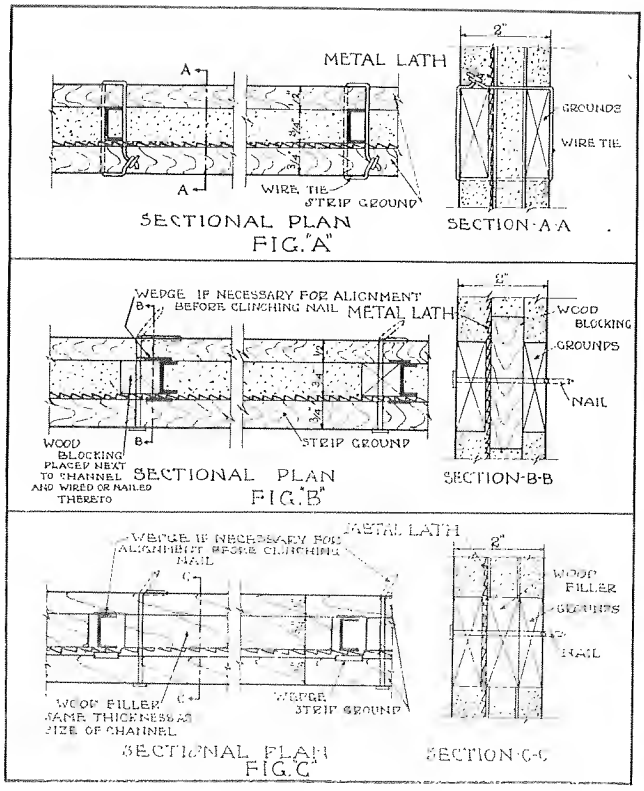


Fig. 124. Three Methods for Attaching Strip Grounds.

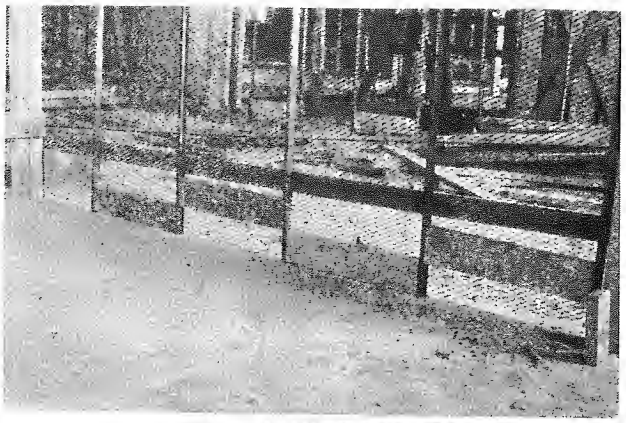


Fig. 126 (Above) Intermittent Strip Grounds for Wide Baseboard.

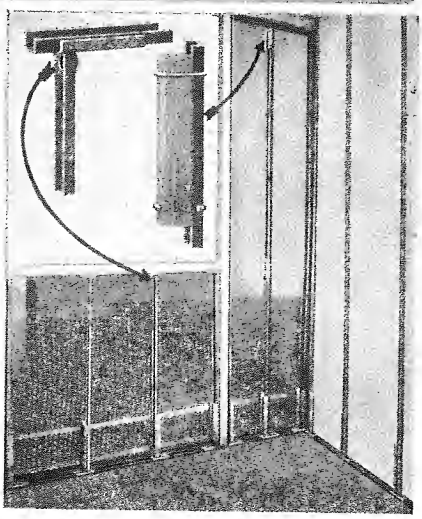


Fig. 127 (Right) Special Stud Shoe and Nailing Block system.

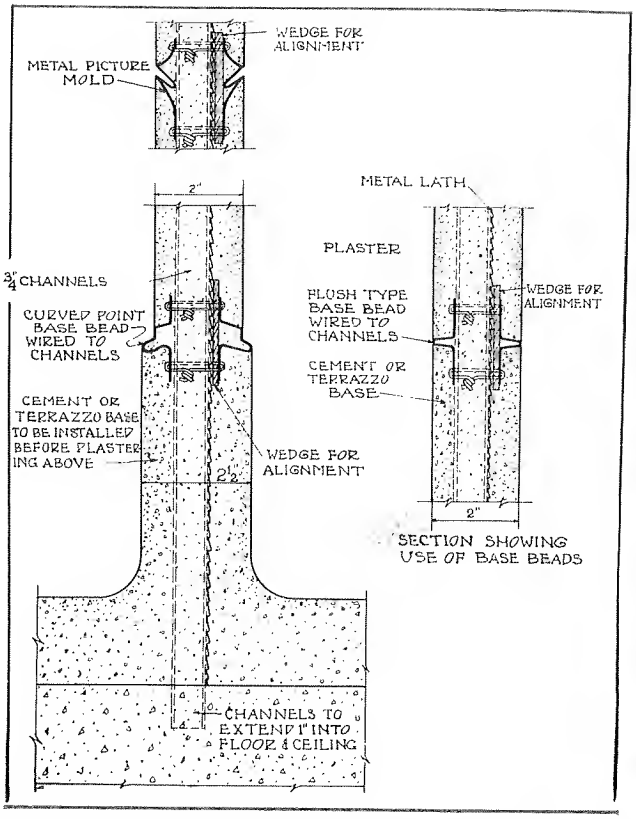


Fig. 125. Metal Picture Mold, Flush and Curved-Point Base Beads (Also Called Screeds) Eliminate Separate Grounds. Note: Detail Similar, Using Floor Track.

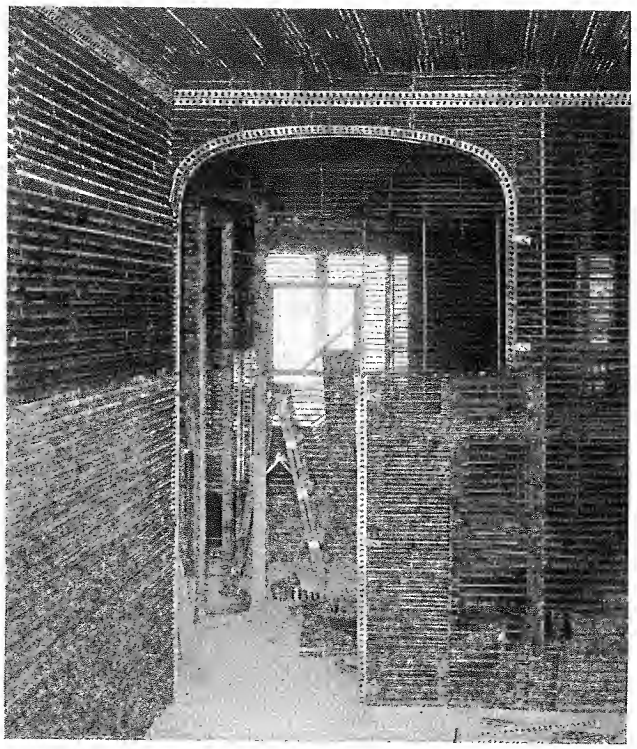


Fig. 128. Installation of Metal Picture Mold and Corner Bead for Arched Cased Openings In Apartment Unit. Prefabricated Metal Arch Installations Similar.

In the very large Parkchester (New York City) development of the Metropolitan Life Insurance Company, constructed in 1940, the 2 x 2-inch wood floor runner *(Figure 128-A)* is utilized extensively.

Floor runners of wood are secured to masonry floors by expansion drive bolts such as Rawl Drives or by nails driven into wood plugs set in the concrete or by the method, in *Figure 110*, using masonry nails.

3. Metal Base Screeds, Picture Mold and Corner Beads Are Important Accessories

Metal base screeds or grounds are recommended for use when wainscots or bases of portland cement, terrazzo, or similar materials are used and it is desired for upkeep reasons or for appearance sake to have a line of demarkation between them and the plaster above. The use of base screeds facilitate construction as they expedite the application of both the plaster and the terrazzo base for which they act not only as a dual ground, but also as a stopping point since gypsum plaster and terrazzo base finishes do not affiliate. They are specially adapted for use with Metal Lath Partitions as the lather readily wire ties them to the regular channel studs, and screeds are erected more rapidly on Metal Lath than on any other type of construction. *(See Figure 129.)*

Metal base screeds are stamped and formed out of sheets of galvanized steel and are of two types: flush and offset, and with punched or expanded flanges. Flush screeds are used where the plastering above and below finishes to the same line. *(See Figure 125.)* The offset type is employed for places where the plastering sets back from the base. *Figure 125* also shows a section of curved point base screed, of the offset variety, with plaster above and terrazzo base below. On the channel side of the partition the screeds are wired through holes in their flanges direct to the channels. On the lath side the screeds are lined up by using wedges over the studs.

Metal picture molds of the concealed type are used and applied in the same manner as metal screeds. Their chief advantage, likewise, is economy, as a separate wood ground is dispensed with since the molds serve both for the hanging of picures and as grounds for the plaster. They are inconspicuous in the wall, more sanitary than wood molding, require no decorating, and offer maximum fire protection. *(See Figure 125.)* Holes are provided in the flanges of the metal mold to facilitate tying to the lath at regular intervals.

Corner beads used both for corner protection and plastering grounds are, as in the case of base screed and picture mold, fabricated from sheets of galvanized steel; occasionally from pure zinc. Corner bead galvanized after forming is not practicable. Many types are available, including small nose and bull nose, with narrow or wide punched flanges, expansion or welded flauges, or rail-type construction, and all are attached more readily over the Metal Lath, because of its open mesh, than to any other type of plastering base. A typical installation of corner bead and picture mold is shown in *Figure 128*.

4. General Notes on Grounds and Beads

Attention is called to the fact that with the exception of the special case shown in *Figure 126*, the grounds and beads are applied *after* the lath is attached. This assures a continuous rigid plastering base at least expense, and a better job than when the grounds are applied first and the lath cut to fit between.

In any use of grounds or screeds it should be remembered that they serve primarily as guides to which the plasterer must work. If the finished plaster partition is to be perfectly straight, plumb, and of the required thickness, so that the mechanics who come later have a straight, solid, even base on which to apply the finish trim, etc., the grounds must be carefully aligned regardless of any irregularities in the studs.

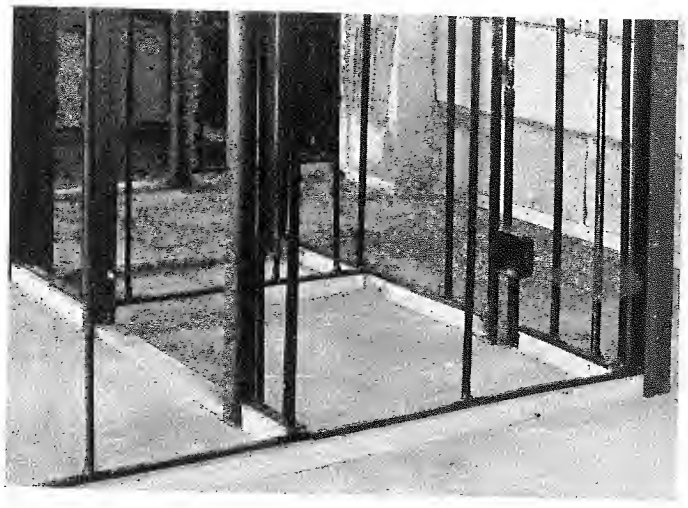


Fig. 128-A. Wood Floor Runners for Nailing Base, and Channel Floor Runners and Stud Shoes for Stud Anchorage, Parkchester Housing Development, New York City.

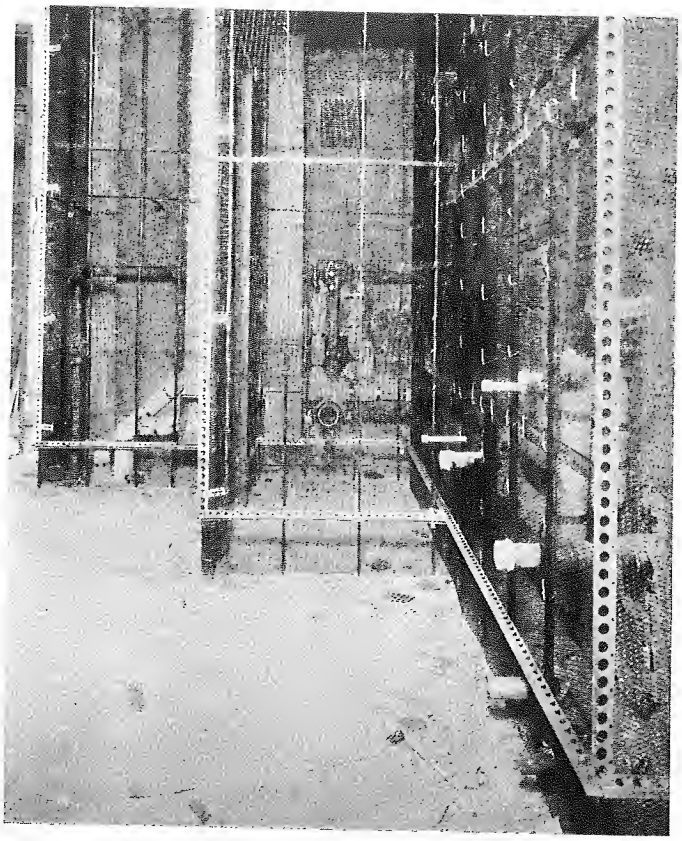


Fig. 129. Extensive Use of Corner Bead and Curved Point Base Screed in connection with Metal Lath Partitions and Furring in Colored Hospital, St. Louis, Mo.

CHAPTER XVII

Metal Bucks and Door Frames; Metal Base and Trim

(For Names of Metal Buck Manufacturers See Appendix)

Due to extensive experience, in recent years, in numerous installations of metal bucks, etc., a considerable number of improvements in design and methods of anchorage have been developed and this general availability of satisfactory details has aided materially in the widespread specification of 2-Inch Solid Metal Lath and Plaster Partitions. Typical details as shown in *Figures 101 and 132* show how cracking around metal bucks is guarded against, not only by floor and wall anchorage, but also by the new ceiling anchors which make the construction around the entire opening a well-integrated unit. CHAPTER XIII discusses these matters in detail.

Metal bucks and trim, with their simplified and low-cost erection, in many instances are less expensively erected than many types of wood. Accordingly, they are specially favored wherever sanitation, low maintenance expense, fireproofness and appearance are important requisites.

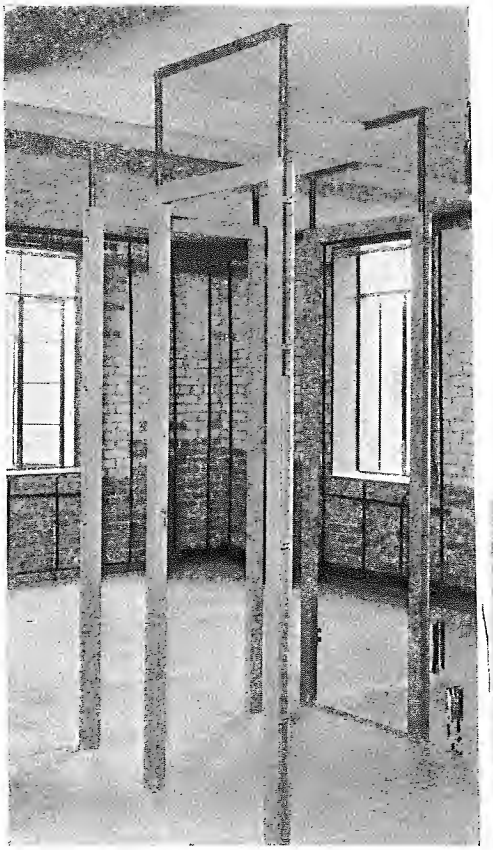
1. Metal Trim Particularly Suited for Use with Metal Lath Partitions

There is a special advantage in the use of metal frame and trim with Metal Lath Partitions. This, because both the trim and the backbone of the partition — the studs and lath — are all of steel. Thus the two supplement each other to make the whole virtually a unitary steel-reinforced partition. When bucks also are of metal, the construction is entirely of fire resistive, rigid, non-warping and non-swelling materials and is the last word in permanent partition construction.

2. Types of Metal Bucks and Trim

Practically all metal buck, frame and trim combinations in use today are factory-assembled and sent to the job ready for erection. They are of several types but in most cases are made up of a single unit with the finished jamb constituting both buck and trim.

However, in addition to the casing or trim which comes as an integral part of the construction there are two other types: that in which the trim is sprung on, and another which is screwed to the frame. When separate from the frame, the bucks may be either solid or hollow, and either metal or wood.



B. (Above). Tubular Uprights adjusted to several beam and ceiling heights. Bucks are anchored at floor by 14-gauge angles welded to each jamb and secured to floor by Rawl Drives or similar devices.

C. (Right Center). Tubular Uprights are secured to sides of beams by special wide-flange sections.

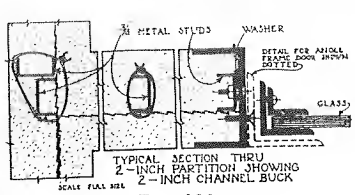


Fig. 130

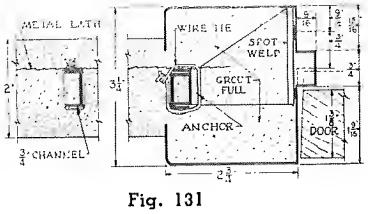
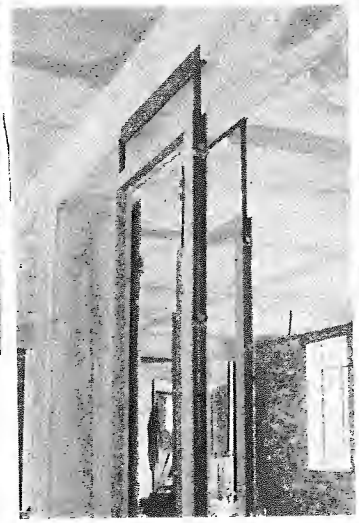


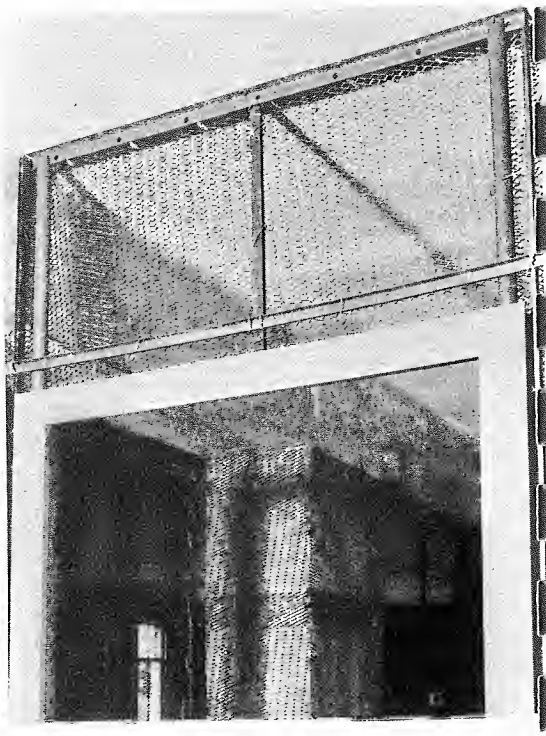
Fig. 131

Fig. 132. Flush Metal Bucks in Queensbridge Housing Project, New York City.

For scaled line drawing see Figure 101 — Detail A, also see Figures 138-B and 139.

A. (Right). Close-up reveals form of T-shaped ceiling runner and manner in which tubular uprights are fastened.





3. Flush Type Combined Buck Jamb and Trim

Probably the simplest form of metal jamb construction is that shown in *Figure 130* in which a 2-inch channel is welded or bent around to form the one-piece jamb and head of the door frame and at the same time functions as the door buck. To it the nearest channel stud of the partition is securely bolted so that the frame is anchored to the floor and ceiling construction as customary. It will be noted that the channel-iron jamb is exposed in the finished partition. This form of door frame is commonly used in basement openings, storage warehouses and elsewhere where ruggedness is more important than finished appearance.

A variation of this buck consists of pairs of small hot-rolled angles spot-welded at intervals and finishing 2 inches and upward in outside dimension.

With the recent development of new types of ceiling anchors *(see Figure 101)* adjustable to every variety of ceiling slab conditions, the flush combined buck-jamb-trim shown in *Figures 132 and 138-B* and installed in 1939, in a very large housing project, is destined to become generally useful for many types of buildings. The tubular steel uprights shown here slip down inside the frame for shipment to the job and are held safe by the special screws in the side anchors.

4. Semi-Flush Jamb and Trim

Because of general simplicity of fabrication and installation, this general type of combined jamb-buck and trim *(Figure 137* and right hand detail of *Figure 101)* has come to be one of the most popular in general use and has been standard in many large scale housing projects erected in recent years. At the jamb the metal sections measure about 2½ inches across and hence provide a slight reveal back to the face of the 2-inch partition. This simplifies painting routine, although not quite as desirable from the standpoint of plastering as the flush buck of *Figure 132* or the detail of *Figures 133 and 134*. Here the finished jamb being only 2 inches thick, is available also as a plastering screed. However, the extra half-inch thickness in the 2½-inch buck is very helpful in providing additional depth to resist door-impacts.

Still another variation of the unornamented semi-flush jamb and trim combination is shown in *Figure 131* which shows how the out-to-out dimension may be increased to accommodate a very thick door, etc.

5. Combined Buck, Jamb and Membered Casing

Considerably more ornate is the metal casing shown in *Figure 133* with multi-membered trim lines fabricated from one piece of steel and used in a large modern apartment building (1939). Another variant used in apartments and hotel buildings is shown in the detail of *Figure 134-A*. Although the method of anchorage shown in the latter instance is somewhat different

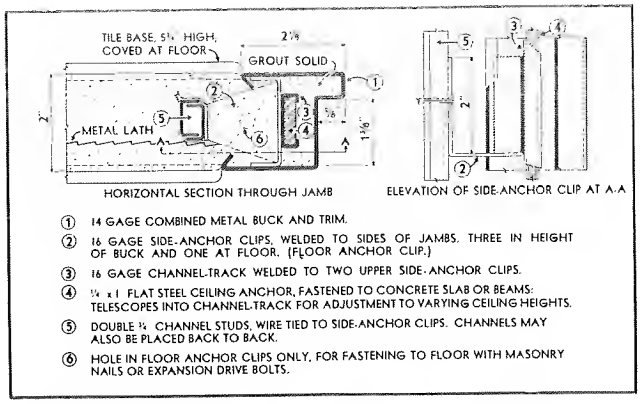
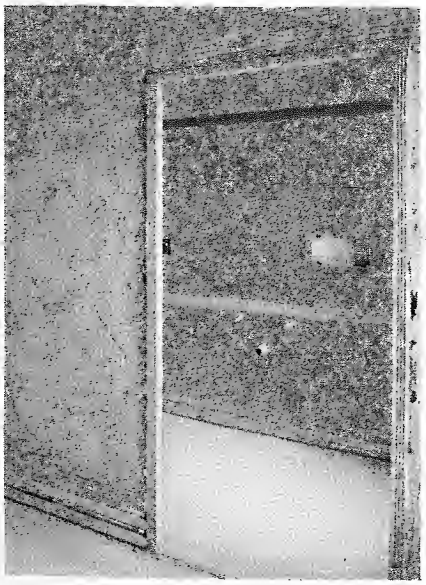


Fig. 134. Flush Type Combined Metal Buck and Trim in St. Joseph's Hospital, Beaver Dam, Wis. Brust & Brust, Architects, Milwaukee.



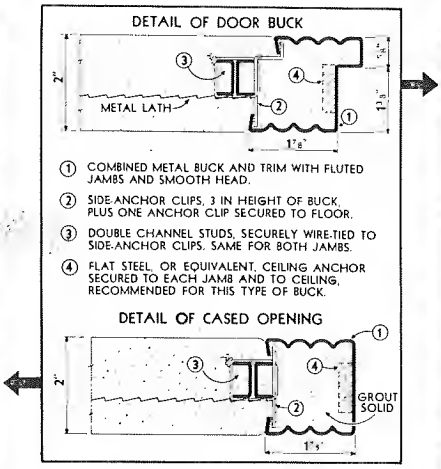


Fig. 133. Ornamental Combined Metal Buck and Trim, Marine Drive Apts., Chicago. Oman & Lilienthal, Architects.

than those previously described, any of them can be adapted to it. Note that when solidly filled with plaster, or with the hollow of the buck grouted with portland cement concrete, very substantial anchorage and impact resistance is provided.

After the brown coat of plaster was applied to the metal lath partitions in the St. Catherine School at St. Paul, Minnesota (H. A. Sullwood, St. Paul, Architect), a small opening was left near the top of the steel door frame. Into this liquid cement grout was poured until the frame was filled solid, the brown coat having stopped the opening in the back of the frame. The channel studs were let into the concrete of floors and ceilings from 1 to 1½ inches, the construction being further stiffened by putting in a terrazzo base into which the lower portion of studs was firmly anchored before any plastering was done.

In *Figures 131 to 134 and 138-B* the trim, buck and frame are all in place during the course of plastering.

6. Unfilled Buck with Clipped Or Screwed-on Casing and Frame

Clipped-on casings are illustrated in *Figure 135* and the screwed-on casing in *Figure 136*. In the latter the frame also is separate from the buck. It is sent to the job "*knocked down*". After the partition is plastered, the frame is screwed to buck, the casing or trim being in turn sprung-on or screwed to the frame. The trim is thus less likely to be marred during the course of construction.

Note that the detached type of casing has two important advantages. In the first place the buck can be made sturdier because it is hidden better; and the buck acts as a ground for the plaster.

7. Metal Base

An important incentive which has given metal base much of its current vogue in large scale housing has been the requirement that upkeep expense and maintenance on Federal-financed construction shall be kept at the lowest possible level in view of the fact that amortization of investment has been extended to cover a period of 60 years instead of the usual 20 or 25 years. With its hard, paintable surface, a base of sheet steel serves admirably to prevent deterioration in that part of the partition which gets the most wear, especially from cleaning equipment; and, of course, it is vermin-proof and sanitary.

Metal Base is of Two Types Separate and Integral

Separate metal base which is applied after the plastering is completed is shown in *Figures 137 and 138-A*. It is available in a variety of standard sections 4 inches and 6 inches high.

Fig. 137. Combined Metal Jamb, Buck and Trim with Separate Metal Base, Julia Lathrop Housing Project, Chicago.

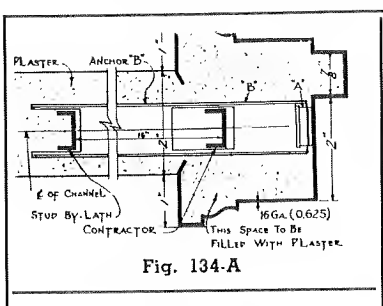


Fig. 134-A

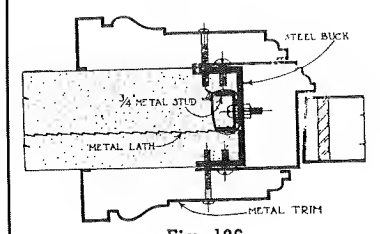


Fig. 136

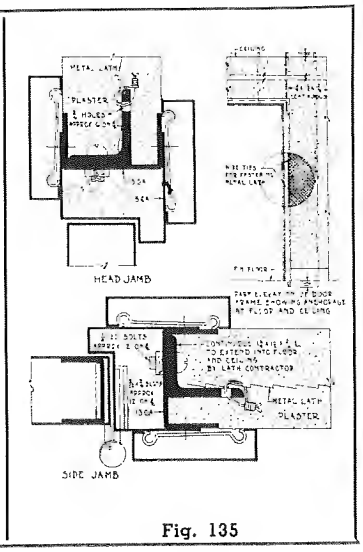


Fig. 135

Integral metal base, a recent development in Metal Lath Partition construction, combines the base with a metal track or sockets for the lower ends of the studs and thus is in place before plastering begins. In fact in most instances it is a flush guide for the plasterer. *(Figure 138-B.)*

With the self-aligning metal base secured to the masonry by masonry nails or Rawl-drives, etc., the track for the studs is provided simultaneously. In some cases, separate attachments for the track are not necessary, while in others its attachment is greatly simplified by the design of the base.

In all "integral" metal base it is important that it be filled solidly with plaster or cement grout so that it will serve to give proper anchorage, and, further, will effectively seal the base for sanitation, fire resistance and sound deadening. For this reason the lath should be stopped just above the top of the base to permit free flowage downward of the soft plaster or grout.

It is also recommended that where such metal base is in direct contact with masonry floors that it be made from galvanized or copper bearing steel and be given at least two good coats of rust-inhibitive paint. Where there is likelihood that moisture will collect at the juncture of base and floor slab this joint should be grouted up during construction with portland cement and pointed, or a mastic used for this purpose.

8. Miscellaneous Metal Trim

Not only metal base, but metal carpet fasteners and anchors and metal cove of various patterns, stops, scribes, wire and miscellaneous moldings of all shapes, sizes and description are easily applied to Metal Lath Partitions. They are produced by a large number of manufacturers. For list see APPENDIX. Also see CHAPTER XXVI for other details.

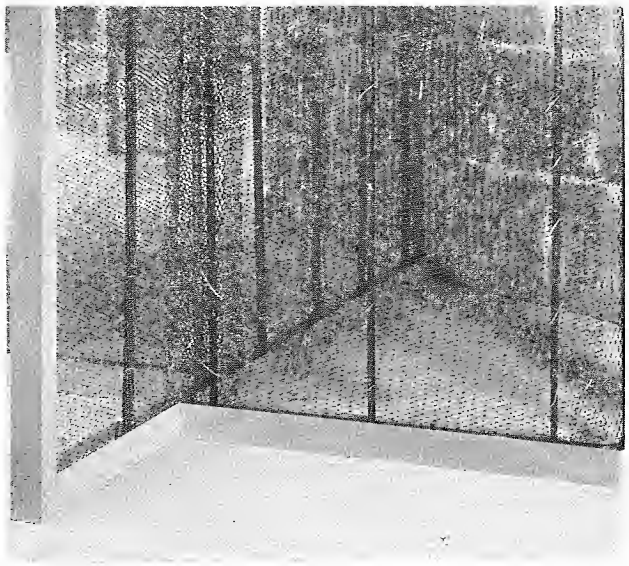


Fig. 139. Close-up of Integral Metal Base (Figure 138-B) Showing Flexibility of use for Angular Intersections, etc. See also Figure 132.

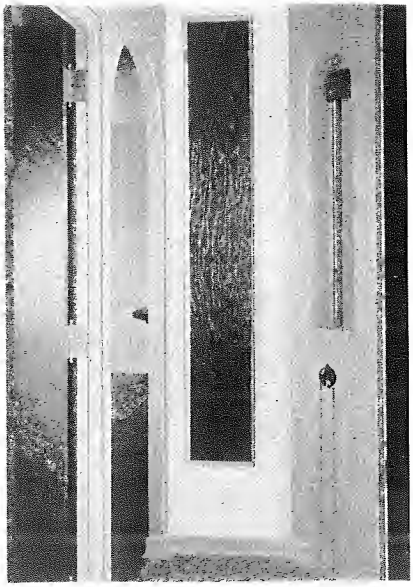


Fig. 138-A. Separate Metal Base Applied to 2-Inch Solid Metal Lath Partitions.

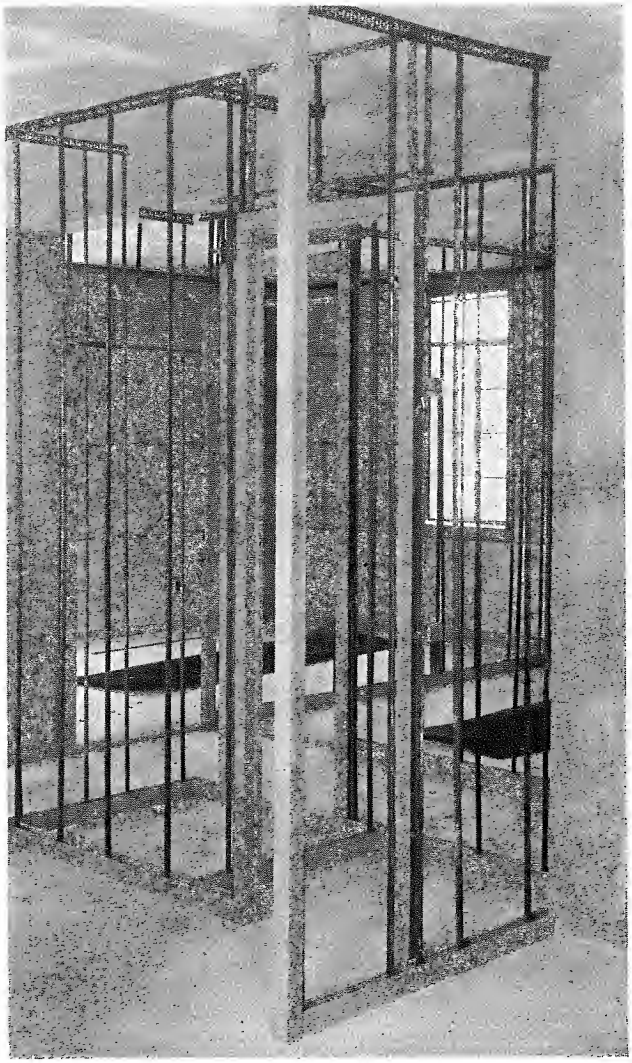


Fig. 138-B. Combined Flush Metal Buck, Jamb and Trim with Flush Integral Metal Base, Queensbridge Housing, New York City. William F. R. Ballard, Chief Architect.

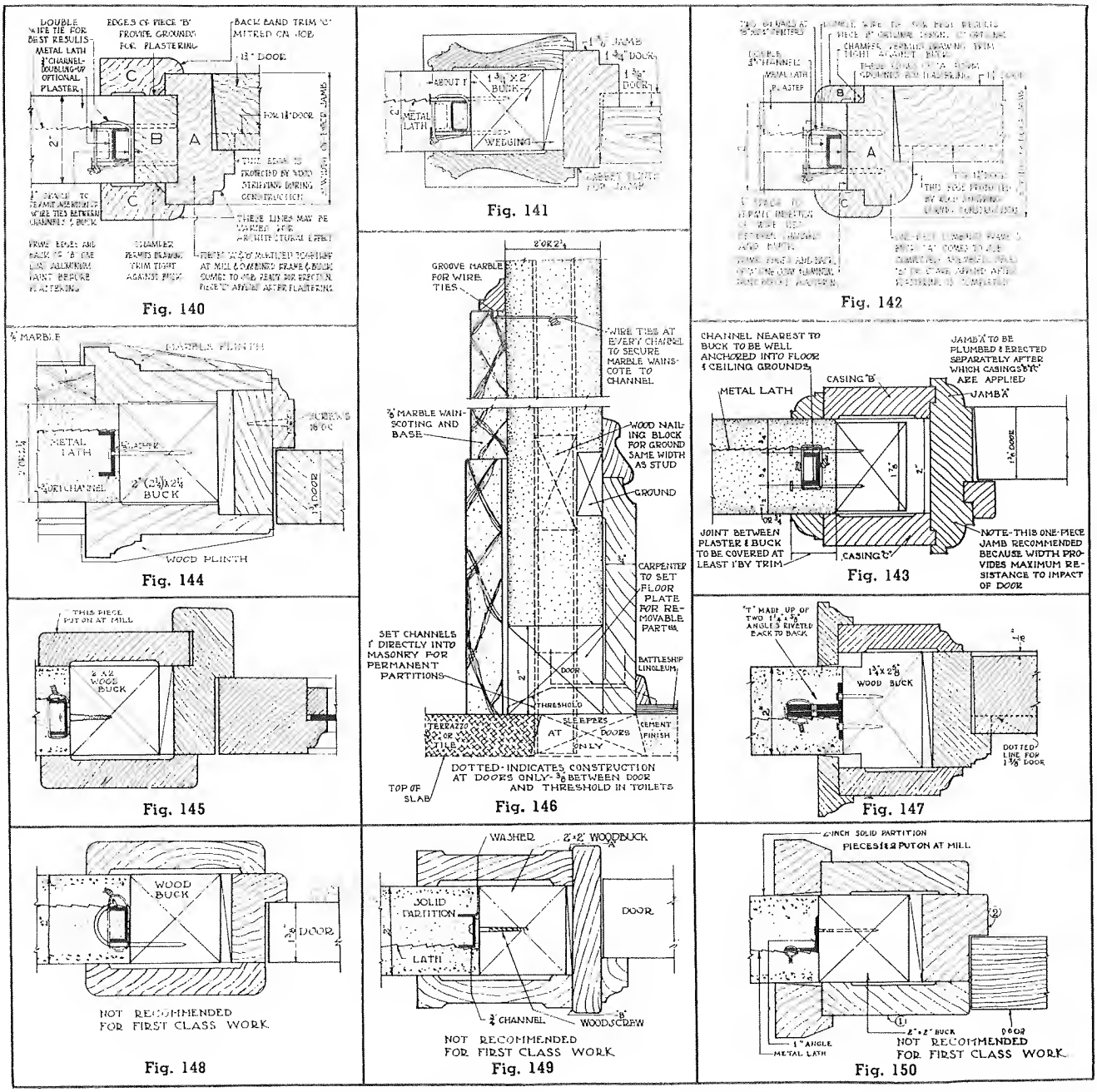
CHAPTER XVIII
Wood Bucks and Door Frames; Wood Base and Trim
1. Door Jamb and Casing Details

See also CHAPTER XXVI for Miscellaneous Details

Two-Inch Metal Lath Partition millwork, with its narrower buck and jamb, departs in some respects from that commonly employed in thicker block and tile partitions. For this reason, to facilitate its proper design, it is described at some length in this chapter.

In recent years architects have developed a large number of satisfactory details for door casings, trim, borrowed-light panels and other millwork used for this type of construction. They are a considerable improvement over those previously in use.

Some architects rate the appearance of a partition above utilitarian needs. Accordingly, types of door casings are shown, which experience has proved to embody the requisite appearance of stability in keeping with the admitted strength of 2-Inch Metal Lath Partitions.



Figs. 140 to 147. Illustrations of RECOMMENDED Wood Door Buck and Trim Details for Solid Partitions. (Although single channel studs, adjacent to the door bucks, shown in some of the above details are generally satisfactory, double studs are recommended for their greater strength.)

Figs. 148 to 150. Are NOT Recommended for First-Class Work. (See text.)

It is also important to devise trim that will provide amply for adjustment and permit doors to hang and close properly and, in general, to give a neat appearing job. Trim cannot be expected to conceal rough bucks which are not built for it. Finally, in relation to the rough buck, the detail of the trim should be such that it will not open up or warp and thus destroy the privacy of the occupants of rooms, or show disfiguring plaster cracks around doors.

2. Four Rules for Detailing Wood Trim Around Doors

The following general principles are based on a study of construction details and comparison of durability and appearance of the finish around hundreds of door openings in 2-Inch Metal Lath Partitions:

(1) The door buck should be firmly secured to the floor and a reinforced or double-stud continuous from floor to ceiling be provided on the partition side of bucks on each side of the door opening. (CHAPTER XIII, Article1.)

(2) Door jambs should be made as much wider than the thickness of the partition, as practicable, and whenever possible should be of one piece in order to provide maximum resistance against impacts.

(3) Trim around doors should lap over the joint between the buck and the plaster not less than one inch.

(4) Trim or casing details should develop the appearance of stability, wherever this is particularly desirable.

3. Specially Recommended Buck and Trim Details

Combined Buck and Jamb Detail

A very satisfactory detail developed by architects Bowling and Shank, consists of only two parts, *Figure 140*, and is in reality, buck and jamb combined. It comes to the job pre-assembled and is erected before any plaster is applied. A piece "*B*" exactly two inches wide is rabbetted into the back of the frame or jamb piece "*A*", and thus provides a ground to which the plasterer can work. Members of the jamb and head are lapped alternately to make it almost impossible for joints to open up.

Surfaces in contact with wet plaster should be waterproofed with aluminum or similar moisture-resisting paint. Exposed finished surfaces are protected by temporary wood stripping to about shoulder height to prevent damage by workmen. After the plastering is done, casing or trim is mitered and cut on the job to fit.

Among the other advantages of this buck are the following:

(1) It can be economically produced as the main portion is cut out of a single 2 x 4 piece. (In most other details three separate pieces are needed entailing greater mill cost, and carpenter labor). (2) The jamb offers a solid 3-inch width to resist door slamming. (3) As the door stop is an integral part of the jamb there is no possibility of the stop coming apart or warping to afford a view into the room from the corridor. (4) There is a minimum amount of labor in the application of the trim and this is the only finished carpentry work which is required since all the rest of the frame and trim has been provided in original erection. This eliminates at least half of the carpentry labor in the total erected cost of the opening as compared with ordinary construction. (5) The entire width of the trim is only about two-thirds of the width of ordinary casing, a feature which is desired by many architects. (6) The casing or trim, and in fact the moldings of the frame itself can be varied for a more ornate effect.

Narrow Combined Buck and Jamb In Modern Hospital

Another neat combined buck and jamb is shown in *Figure 141*. The upper-half detail is adapted from an almost identical detail used in 1939 by Chas. F. Dean, Architect for the Maternity Hospital, Sacramento, California. In the lower-half a back-band variant is shown. Its simplicity of outline commends it for this use. Furthermore, it is very economical as it can be cut out of a single piece of 2 x 3-inch (nominal) 1⅝ x 2¾-inch actual size material. Two coats of paint were applied to the jamb-buck before plastering was begun, since, as in *Figure 140*, the buck-jamb also serves as ground or screed for the plasterer to work to. Suitable temporary protection should also be furnished to prevent damage to the finished jamb by wheelbarrows, etc.

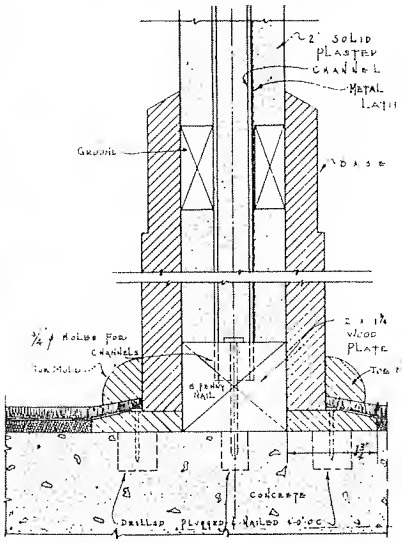


Fig. 152. Baseboard and Carpet Strip Detail, Hotel Rienzi, Chicago. (Hooper and Janusch, Arch's.)

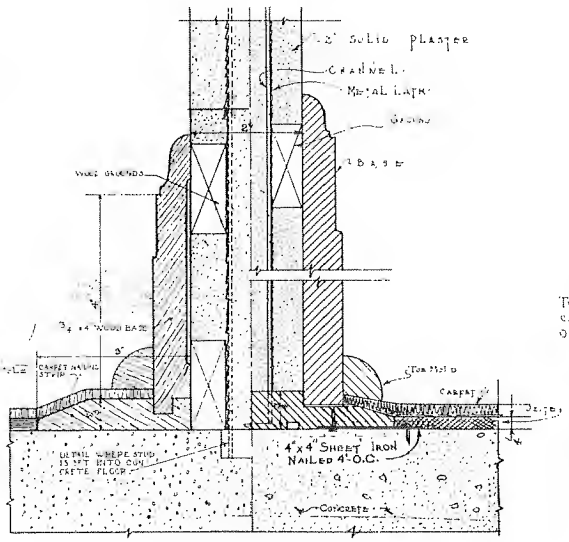


Fig. 153. (LEFT) Baseboard and Carpet Strip Detail (Preston Bradshaw, Architect) (RIGHT) Modification of Fig. 152 Combining Wood Buck and Carpet Strips.

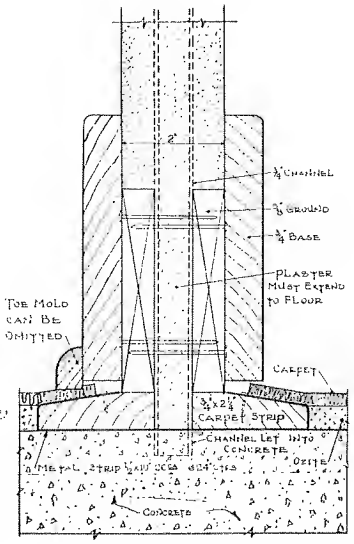


Fig. 154 Carpet Strip and Metal Anchor, Heldenbrand Hotel, Pontiac, Mich.

Conventional Detail with Separate Buck and Trim

The jamb construction with separate rough buck, shown in *Figure 142*, combines stability, ease of erection and low cost; it is adapted from details prepared by Manske and Bartling, Architects. The secret of its strength is in the extra wide finish jamb which also accommodates 1¾-inch doors.

Sturdy Wood Detail for Large Office Building

Especially strong is the detail of *Figure 143* prepared by Architect George Willis for the 25-story Milam Building. *(See Plate I.)* A solid piece of oak, 1 x 4-inch was used for the door jambs and into it were rabbeted the casing "*B*" and "*C*". With the great width of the jamb "*A*" and the rabbeting, the construction acts as a unit to resist heavy impacts. The back-band trim also covers the joint between plaster and buck by a wide margin, thus hiding the expected shrinkage of the wood bucks. Cracks cannot open up around the doors as the stop is also rabbeted into the jamb. The substantial appearance of the construction around the door openings is illustrated in *Figure 151*.

Mr. Willis advised that although the millwork costs were slightly higher, the erection costs were less so that there was practically no difference between the completed cost of the trim shown in *Figure 143* and that of the general type shown in *Figure 142*.

Other Office Building Door Casing Details

Details shown in *Figure 144* are a slight modification of those used by Architects Coburn, Smith and Evans in the Dallas National Bank Building, Dallas. These illustrate a wide casing in which a mold instead of a back-band casing is used to show greater thickness at the plaster line. Companion details for marble wainscoting are shown in *Figure 146*. Almost identical details were used by these Architects for the 25-story Republic Building and for the tall American Exchange Building, both in Dallas. *(See Plate I.)* The performance of this construction as shown by critical examination has been highly satisfactory.

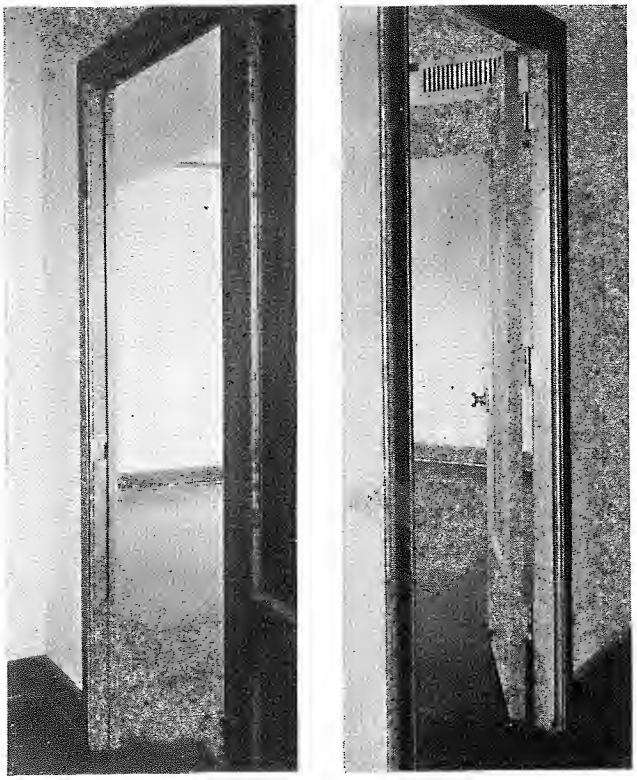


Fig. 151. Wood Jamb and Trim Detail of Milam Building, San Antonio, Texas (George Willis, Architect).

Simple Sanitary Casing Used In Hospitals and Dormitories

The detail in *Figure 145*, Mr. Cervin, architect, proved so very satisfactory in the Immanuel Hospital of Omaha in 1909 that it has been used frequently in succeeding years. Note that one part of the casing is rabbeted into the wide and sturdy jamb, these two pieces being put together at the mill. This simplifies erection and also provides ample adjustment for any variation in the bucks and for convenience in plumbing up. This detail with its wide jamb is recommended.

Pleasing Lines in Hotel Trim Detail

Gustave Drach, Cincinnati architect, used the details shown in *Figure 147* in Sheet Metal Lath Solid Partitions in both the Gibson Hotel at Cincinnati, and the Neil House at Columbus, with very satisfactory results. Note how the back-band trim is detailed to build up the depth.

4. Undesirable Wood Buck and Trim Details

Any of the details described in Article 3, preceding, can be used with assurance in first class work. However, in the belief that architects who prefer to make their own details will also be interested in criticisms of details *which have not been found wholly satisfactory*, some of these will now be described. Furthermore, where low first cost is most important, or where a second rate class of construction is permissible, some of these details may be found suitable.

A simple form of buck and trim that is used where cost, rather than appearance and durability, is the first consideration, is shown in *Figure 148*. However, it is not recommended for first class work because the narrow jamb does not provide desirable stiffness, nor is adequate clearance provided for the door hinges.

The detail shown in *Figure 149* although more rigid because of its one-piece jamb than that in *Figure 148*, is not suited to accommodate irregularities in the door buck so that variations in projection of jamb beyond casing at "*A*" and "*B*" will undoubtedly occur. Another objection to using this detail is that the casing is not rabbeted to the jamb, or vice versa, and may permit objectionable cracks to open up due to warping or shrinkage. Here, again, suitable provisions for hinges have not been made. The jamb detail of *Figure 150* is somewhat better appearing than *Figures 148 and 149* because of the back-band trim, but it is not satisfactory because screws for the door hinges will not strike solid wood but will enter the joint between jamb and casing. Furthermore, the width of jamb is not sufficient to withstand impact.

5. Miscellaneous Wood Trim, Baseboard, and Carpet-Strip Details

Wood panel strips, occasionally used for decorative effects on the face of partitions, are attached without grounds direct to Solid Metal Lath Partitions by dovetail toe-nailing from opposite edges of the molding and will not come loose. For heavy panelling, wood grounds are recommended.

The modern, narrow wood base is readily secured to 2 x 2-inch wood floor runners laid directly on and anchored by means described in CHAPTER XVI, to the rough floor. However, for base more than 3 inches high, an additional ground strip for the secure nailing of the top of the base is generally preferred. *(See Figure 152.)* Sometimes ground strips for both top and bottom of the base, *Figure 153*, are used. In

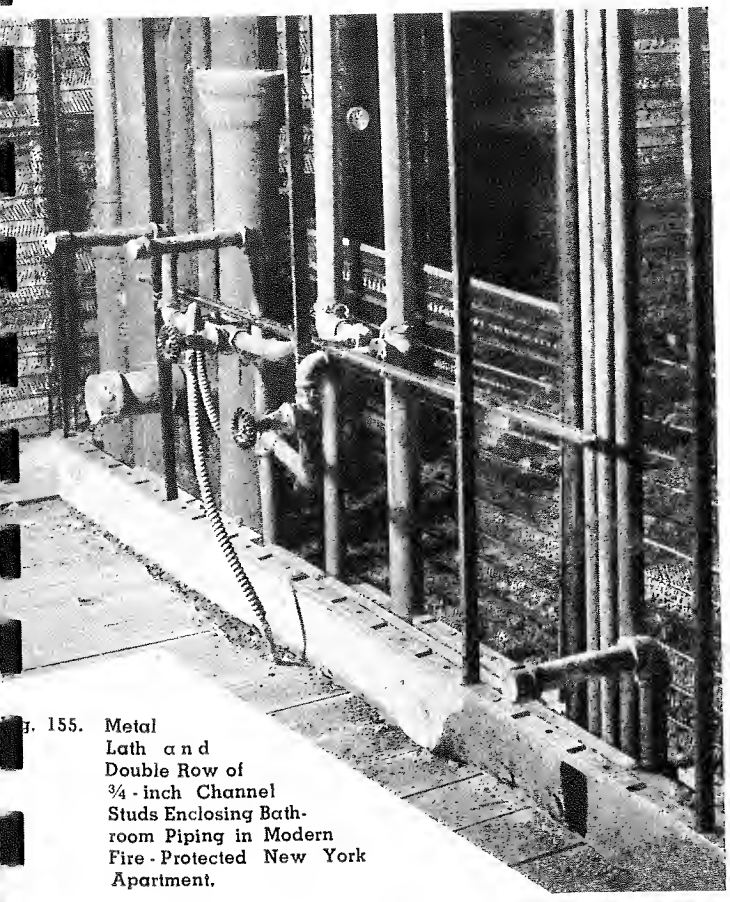
others, a 2 x 4-inch runner set on edge is employed to furnish nailing top and bottom. These details may be used where the finished floor is wood. They are also employed where asphalt or rubber tile or linoleum are laid in mastic directly on the finished concrete, as in housing and apartment buildings, in office buildings and for many other occupancies.

Where all-over carpeting is applied on padding laid directly on the finished cement, anchorage should be provided for the edges of the carpeting so it will lay flat and snug and permit of ready removal for cleaning.

In a Chicago hotel, beveled strips, ⅝-inch thick at the one end and about ¼-inch at the other and 1¾ inches wide were secured to the concrete floor by drilling and plugging holes at 4-foot centers as shown in *Figure 152*. Perhaps cheaper, when a 2 x 2-inch floor runner is used, is to secure it to the floor slab with expansion drive bolts. Still another means used in the attachment of the ground is to nail a small strip of sheet metal to the underside of the runners before laying, and then secure this to the concrete by means of hardened masonry nails. The modification shown at the right of *Figure 153*, in which the carpet strip and the floor buck are of one piece, grooved on the underside to prevent warping, may likewise be applied by means of expansion drive bolts. It is undoubtedly cheaper to install than the three pieces shown in *Fig. 152*.

Another baseboard and carpet strip detail is shown in the left-hand detail of *Figure 153*. Carpet strips and metal anchors used in the Heldenbrand Hotel, Pontiac, Michigan, are shown in *Figure 154*.

Note that in *Figures 153 and 154*, the lower ends of the channel studs may be inserted in channel or other track runners, secured to the slab, instead of being set in holes cut in the concrete, as shown.



g. 155. Metal Lath and Double Row of ¾-inch Channel Studs Enclosing Bathroom Piping in Modern Fire-Protected New York Apartment.

CHAPTER XIX

Installation of Piping, Ducts, and Plumbing and Heating Fixtures

(See Also CHAPTER XIV — Electrical Installations)

1. Provisions for Piping

Advantageous Combinations of Solid and Hollow Partitions

Many builders have adopted the plan of running the 2-Inch Partition as far as possible and then, where piping is to be housed, offsetting to a larger depth, using a hollow partition, and reverting again to the solid partition when the greater depth is no longer necessary.

In this manner the space saving and low cost of the solid partition can be utilized to the utmost, while the pipe space of the somewhat more expensive hollow partition is used only where necessary.

For appearance sake and for economy, no change in thickness should be made where the offset portion is less than 4 feet long. It will be found most economical to run one face of the combination partition straight through, making the offsets from solid partition to hollow all on the side where they are least objectionable. These offsets should be protected by corner beads. Such single offsetting is preferable to an attempt to center the hollow partition on the solid, both because the appearance is better and because only half as much corner bead is needed as when the partition is centered.

With the exception of the small supply pipes sometimes used for shower bath installation, it is recommended that no attempt be made to install pipe exceeding 1-inch in *outside* diameter in 2-Inch Solid Metal Lath Partitions. Piping up to 1½-inch in outside diameter can be installed in 2½-Inch Solid Partitions. In either case such piping, if of steel or iron, should be well painted on the outside to prevent "bleeding" through the plaster.

Pipe Chases Recommended

It is, however, much easier and more satisfactory to plan the piping layout so as to use pipe chases from basement to roof and arrange the fixtures so that they are adjacent to the chases and occupy minimum space. *(See Figure 156.)* This is arranged without difficulty in the average building by furring out a chase from the column fireproofing and placing office lavatories adjacent to these "wet" columns. This is the method generally used in office building construction.

Where a pipe stack occurs, a Hollow Metal Lath and Plaster Partition with prefabricated stud units *(Figure 158)*, or two rows of standard ¾-inch channels *(Figure 155)*, or combination of the two, should be used. In bathrooms the parallel rows of studs can be separated the required distance to clear ventilating stacks, and access panels *(Figure 160)*, are readily built into them so that the plumbing can be easily reached. An excellent illustration of an economical

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space-saving combination of solid and hollow partitions is given in *Figure 157*. This arrangement has been used in several Y. M. C. A. buildings including the Lawson, Chicago, 1930; and Irving Park, Chicago, 1939 (E. B. White, architect.)

The hollow type of Metal Lath Partition is also used very largely between bathrooms in apartments and hotels, where masonry partitions may be used elsewhere in the structure, as the blocks do not lend themselves to cutting around the piping without great expense and difficulty. Furthermore, blocks so cut around are usually in contact with the piping and therefore readily transmit objectionable sounds.

Double rows of masonry blocks also occupy much valuable space. This fact was early recognized in Architect Alfred E. Poor's planning for Red Hook Houses, Brooklyn, N. Y. (constructed in 1939) and an estimated saving of $48,000 was made by utilizing double studded Metal Lath Partitions. (*Architectural Forum*, December, 1938.) Using sound insulating double partitions between bathrooms, relief from annoying sounds of flushing toilets in adjoining apartments is obtained by pads of resilient materials wrapped around pipes where they enter, and inside of, partitions. (*Figure 156-C.*)

2. Devices for Attachment of Fixtures to Partitions

Plumbing fixtures, heavy as they are, may be used with 2-inch Solid Metal Lath Partitions, with complete assurance of satisfactory installation if the details described herein are followed.

One-Side Installations

Lavatories, sinks or similar fixtures hung on Solid Partitions, without the balancing effect of a similar fixture on the opposite side of the partitions, may be attached by standard hangers screwed to a 1 x 6-inch board of the desired length cut between and nailed to the studs if on the channel side; or a strip ground wired to the studs, if on the lath side of the partition. (*Figure 156-A.*) For installations of heavy fixtures a continuous 3/16 x 1½-inch bar with holes punched at 3-inch intervals to facilitate attachment of the fixture, should be secured to the three nearest studs before plastering is begun. Wall hangers are secured to the bar by toggle bolts or similar devices.

Back-To-Back Installations

In the back-to-back installation of kitchen sinks, lavatories, toilets and similar fixtures, a 1 x 6-inch board is cut between the channels on either side and held by nails driven through the webs of the studs. Matching boards, thick enough to be flush with the finish coat of plaster, are nailed on each side of the partition to the 1-by-6. This gives a solid wooden support, firmly anchored to the studding, for the wall hangers used to support the back-to-back fixtures. (*See Figure 156-B.*)

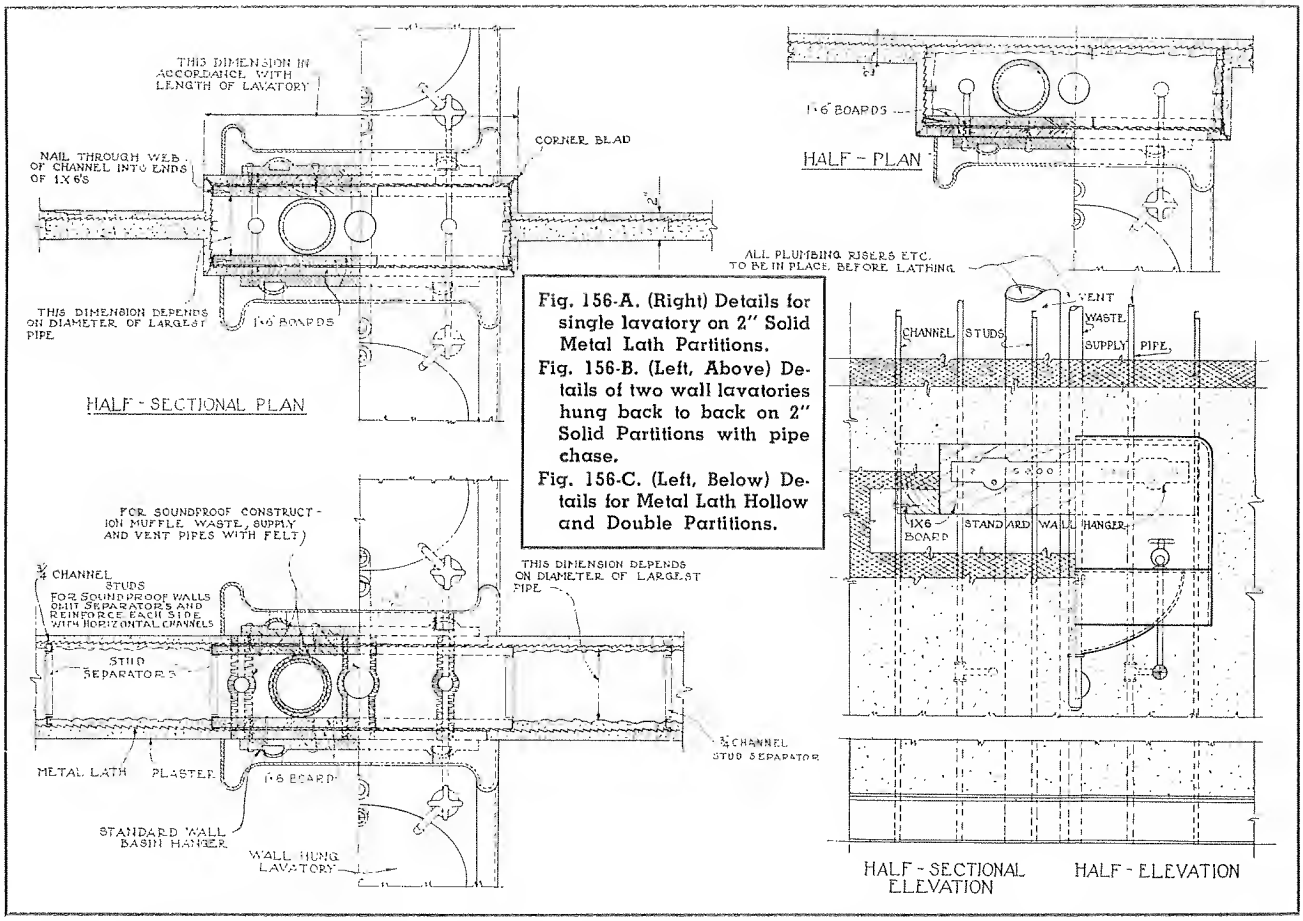


Fig. 156-A. (Right) Details for single lavatory on 2" Solid Metal Lath Partitions.
Fig. 156-B. (Left, Above) Details of two wall lavatories hung back to back on 2" Solid Partitions with pipe chase.
Fig. 156-C. (Left, Below) Details for Metal Lath Hollow and Double Partitions.

Fig. 156. Arrangement of Pipe Stacks on Solid, Hollow and Double Metal Lath Partitions, Showing Method of Attaching Wall-Hung Lavatories.

Iron bar anchors, as described for "One-Side Installations, may be used instead of the wood boards mentioned in the preceding.

Waste pipes, vents, etc., for fixtures on Metal Lath Solid Partitions should be carried in Metal Lath furred pipe stacks as previously described. *See also* CHAPTER XXIII, or pipes may be run up from the floor and left entirely exposed.

Attachment of Fixtures To Hollow and Double Partitions

Where Metal Lath Hollow Partitions are used, installation is simplified. A 1 x 6-inch board is cut between the studs and the fixture is carried either directly on this board or on another strip nailed to it, flush with the plaster. *(Figure 156-C.)*

3. Installation of Bath Tubs

In the case of built-in bath tubs, Metal Lath Solid Partitions should always be laid out so that the tub will set close to the *lath*, instead of the *channel*, side of the partition. When so built, the portion of the partition below the top of the tub, and which, therefore, is inaccessible from the bathroom side, can be plastered the full 2-inch thickness from the channel side, and thus reduce sound transmission.

If the tub is to be tiled-in, it may be framed in with jack or "cripple" studs of steel or lumber and the Metal Lath tied or nailed to the studs. After the scratch coat of portland cement plaster is applied by the plasterer, the job is finished by the tile setter who applies the bedding coat and lays the tile.

General Note on Bathroom and Shower-Room Partition Construction: Metal Lath Partitions are used for all walls around bath and shower rooms for greatest economy, because portland cement must be used to provide a water-resistant embedment for bathroom tile. Metal Lath is the ideal base for portland cement setting beds, and is especially satisfactory for gypsum or lime plasters used for adjoining rooms. *Therefore, one type of partition can be used throughout, with resulting speed of construction.*

4. Heating and Ventilating Ducts

These require hollow partitions for proper housing. Metal supporting straps or bars are easily attached to the metal studding and in turn to the ducts so as to support and position them at intervals. *(See Figure 159, also Figure 205.)* Cost of such installations is correspondingly less than on other construction where channeling or "chasing" of masonry is necessary. All Metal-Lath-and-Plaster ventilating ducts are now coming into use. They can be built inside channel iron furring for both vertical and horizontal runs and are economical in first cost as well as being fully fireproof.

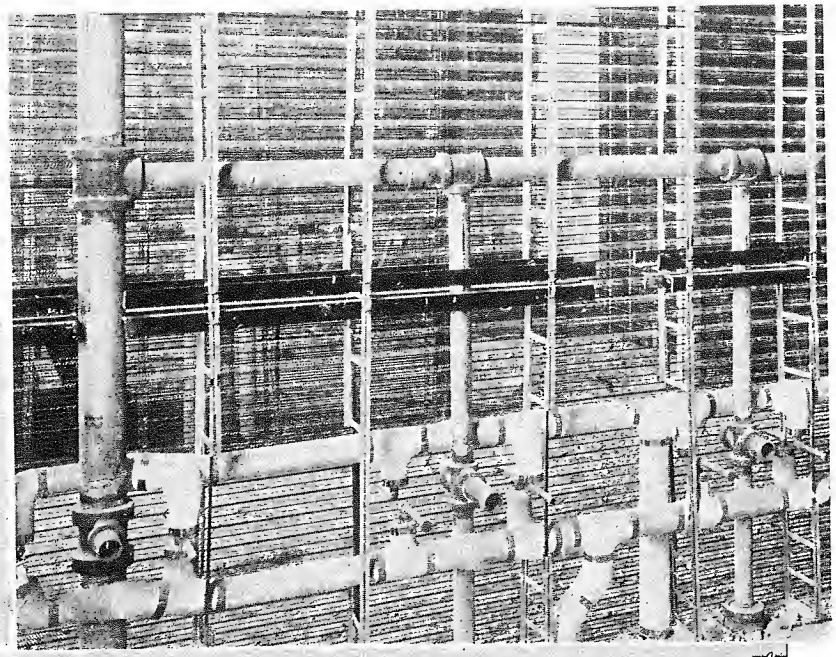
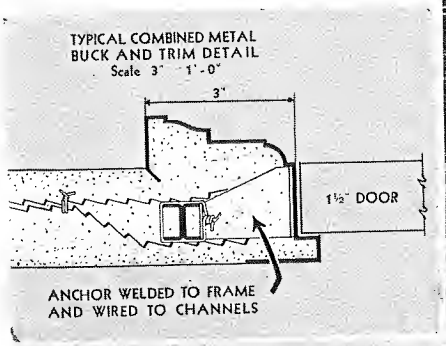
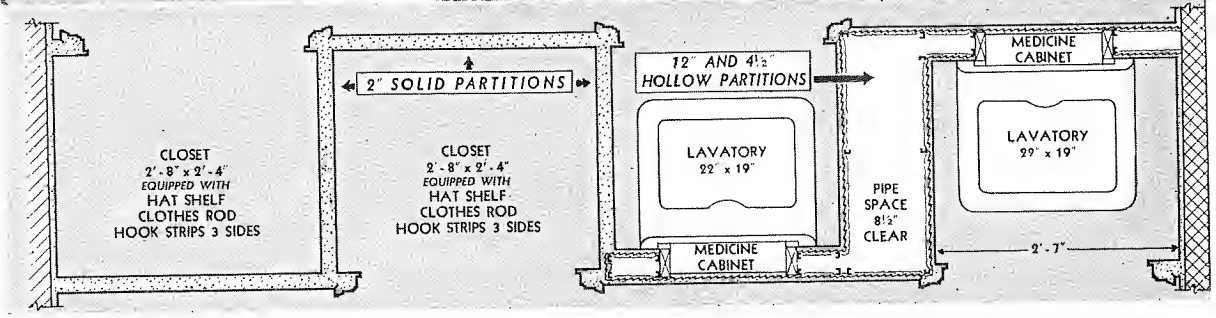


Fig. 158. (RIGHT) Prefabricated Stud Hollow Metal Lath Partitions Provide Many Economies for Installing Work of Mechanical Trades.

Fig. 157. (BELOW) Advantageous Arrangement of Dormitory Lavatories and Clothes Closets.





5. Miscellaneous Plumbing and Heating Equipment Installation Details

(For a Partial List of Manufacturers See Appendix)

Medicine Cabinets, Soap Holders, Towel Racks, Grab Rails

Medicine cabinets of the projecting type are attached to solid partitions by screws into beveled ¾ x 2-inch wood grounds set flush with the plaster. In hollow or double partitions either the projecting or recessed type is used, the latter being installed by screws or nails to headers cut between nearest channel studs. *(See Figure 157.)* The "electrified" bathroom cabinet is adapted for use with the hollow type of Metal Lath Partitions.

For the Solid Partitions there are now available soap holder, towel rack and other bathroom fixtures of the projecting or semi-recess type made of vitreous china. They are embedded in the two inches of plaster without being visible on the other side. These and other devices are also available for hollow and double partitions.

Closet Attachments

Wall hung closets are entirely practical with concealed adjustable sanitary supports. *(Figure 161)*, which carry the load independently of the wall.

Attachment of Radiators to Partitions

In places where space is a premium it is sometimes necessary to hang radiators on to walls above the floor level. For these places a ¼ x 2-inch steel strap hanger bolted to at least three adjoining channel studs should be used.

Access Panels

These should be built into pipe chases to allow ready access to piping and emergency valves. The panel fits flush with the plaster and is painted or otherwise decorated to match the rest of the wall. *(Figure 160.)* The frame of this panel is tied to the lath and furnishes an additional ground for the plaster, while the panel door is held in the frame by special catches that permit opening the panel by prying out the door with a screwdriver, and replacing it with a gentle pressure of the hand

Shower Room Doors

Now available are shower-room doors adapted for use with Solid Partitions. They are provided with a steel frame or buck which reinforces the construction around the opening and makes a water-tight job.

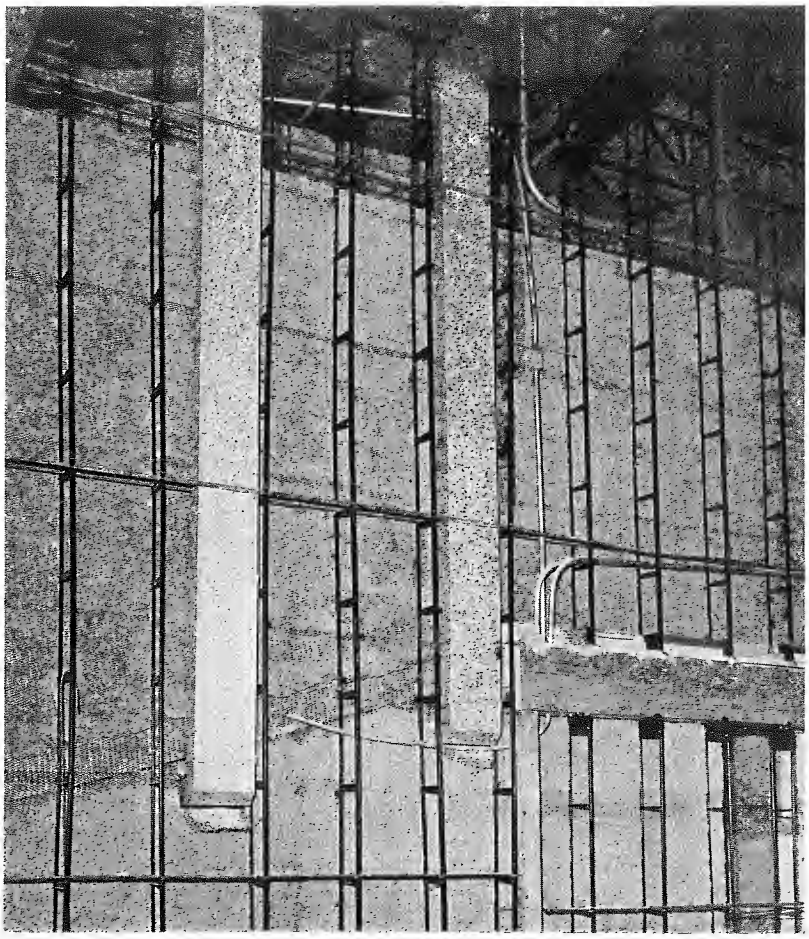


Fig. 159. Straps To Adjoining Studs Support Sheet Metal Ducts In Hollow Spaces and Eliminate Expensive Cutting of Chases.

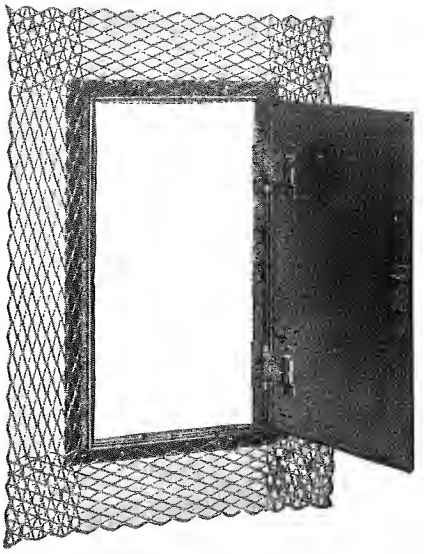


Fig. 160. Metal Access Panel on Metal Lath Partitions.

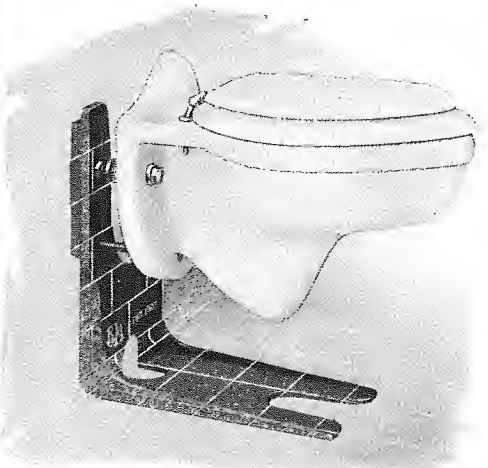


Fig. 161. Adjustable Sanitary Supports for Wall-Hung Closets for Metal Lath Partitions.

CHAPTER XX

Deep Rib Lath "Studless" Construction: Concrete Exterior Walls Built with Metal Lath and Metal Studs

1. Deep Rib and Deep Corrugated Lath

Deep Rib Lath is a form of expanded or sheet Metal Lath having integral deep V or U or dovetail shaped ribs at closely spaced intervals to furnish the stiffening ordinarily supplied by the channel iron in other types of Metal Lath construction. It has been on the market for many years and is frequently used for 2-Inch Solid Partitions and for exterior curtain walls. Ribs vary from about ¾-inch to 1-inch in depth. Sheets come in lengths from 4 to 12 feet. Lath of this general type is manufactured by various lath manufacturers under various trade names. *(See* APPENDIX.*)*

In addition to lath of the general deep-rib type referred to, there is another form consisting of an expanded metal sheet deeply and continuously corrugated *(approximate depth ⅞-inch)* at intervals of about 1½ inches, the corrugation stiffening the sheet to such an extent that, as in the case of the deep rib lath, no studs are required. Sheet Metal Lath, with integral ribs of lesser depth, is also available.

2. Advantages of Deep Rib and Deep Corrugated Laths

Wherever an adequate supply of lathers skilled in the erection of lath and channels by the usual tie-on methods described in the previous chapters, is not available —and this is especially true in foreign lands, in mining camps, in isolated industrial plants, etc.—Deep-rib and Corrugated Laths have found a wide market. This is because less adeptness and accuracy is required, the wire tying being largely dispensed with, due to the elimination of studding. Whole sheets are erected in one operation and a very fair speed of erection is obtained with inexperienced labor.

However, the use of stud-less Solid Metal Lath Partition construction is not confined to localities where the supply of skilled mechanics is limited, as there have been numerous instances where this type of construction has been applied by trained metal lathers.

3. Construction of Interior Partitions

Erection of Lath

NOTE: The methods of erection for deep-rib and deep-corrugated lath partitions are so nearly the same that in the discussion which follows while only the former type is mentioned, it is understood that either type is meant.

Deep-Rib and other integrally studded partitions are erected with the ribs, etc., running either vertically or horizontally, it being customary to run the ribs the short way of the span whichever direction that may be. *(See Figures 162-A and 162-B.)*

End and side laps of sheets are interlocked and tied at approximately 12-inch centers with No. 16-gauge tie wire.

Most of the methods previously shown for anchoring the top and bottom of channel iron partitions to floor and ceiling can be adapted for anchorage of deep rib lath partitions. Several other methods are also used. In one, a small angle or channel iron or expanded metal angle runner is secured to the floor and another to the ceiling by ordinary nails in the case of wood floor and joist; or by stub or hardened masonry nails, expansion drive bolts, etc., where they rest on masonry. To it the deep rib lath is wire-tied by means of dowels used in the form of a *"dutchman's tie"*, or to holes in the upstanding leg of the angle or the openings in the expanded metal angle. Where channel runners are used the ends of the deep rib lath are merely sprung into place between the flanges.

Wood strips embedded or otherwise anchored to masonry floors are used in another system of erection, large spikes being driven into the strips and the lath tied direct to the spikes; or the angle or channel runners mentioned above are secured to this strip and erection proceeds as above. Other contractors provide slots about 1-inch deep in top and bottom of mansonry slabs and beams. The lath sheets are sprung into these slots and held securely by the plaster applied subsequently.

The usual methods of framing around doors or borrowed light partitions with channels as described in *Part II*, CHAPTER XIII, etc., are used in deep-rib partitions.

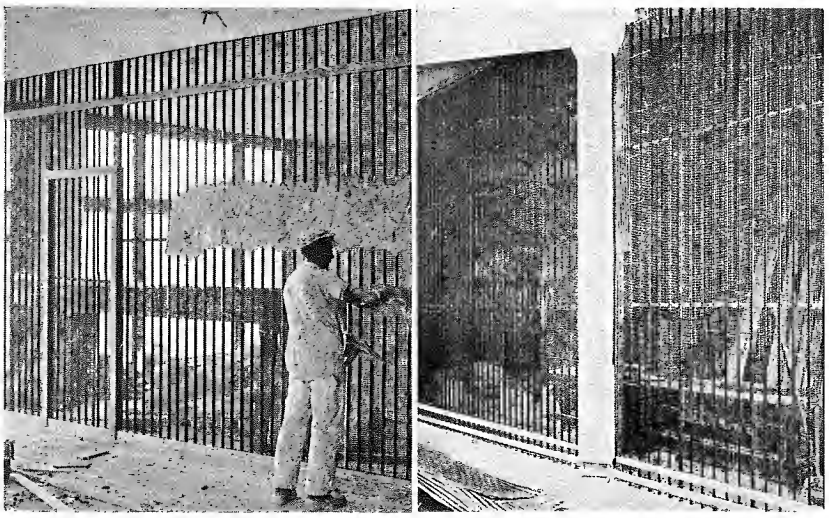


Fig. 162-A and B. Deep Rib Lath Partitions, 10 and 14 ft. High Respectively, In Course of Construction, Showing Grounds for Base and Trim.

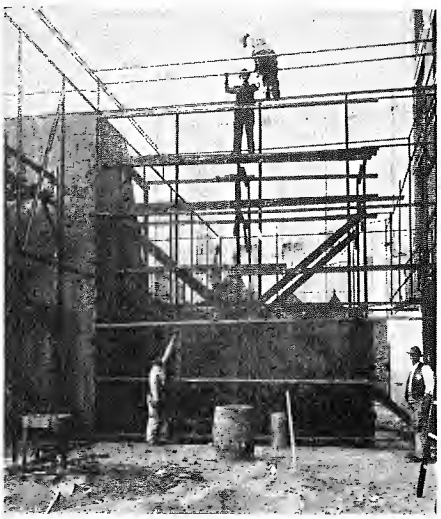


Fig. 163. Deep Rib Lath Used In Combination With Concrete-Stucco for Exterior Walls.

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Bracing for Plastering

Temporary braces are set against the rib side of the sheets at approximately 5-feet centers. These braces are horizontal for the usual vertical ribs. From these braces others are run diagonally to temporary wood strips on the floor or ceiling. Braces are removed when the scratch coat on the opposite side of the partition has set.

4. Curtain Walls, Exteriors of Small Buildings, Fences, etc.

Since curtain and spandrel walls do not bear weight, deep-rib reinforced walls 2 inches or more thick have found a wide use in industrial buildings. *(See Figure 163.)* Because of their shallow depth they are particularly adapted for use as a fill-in for the space between exterior columns and windows. Whether the frame be structural steel, or reinforced concrete, the deep-rib wall is readily attached thereto; in the case of steel it is attached by special clips or wire ties to standard structural angles and in the other, angle runners or slots, as described in Article 3 for partition construction, are used.

For smaller structures such as small residences, filling stations, farm structures, tourist camps, out-buildings, etc., side walls and roofs are built with Deep-Rib Lath and portland cement plaster using a light steel or wood frame.

In all cases where Deep-Rib Lath is used for out-door construction it is important that in all exterior exposures it be covered with not less than 1-inch of concrete stucco or portland cement plastering, and that these mixtures, except for the last or finish coat be neither richer nor leaner than 1:3. A water-proofed finish coat is recommended.

5. Thin Concrete Exterior Walls of Metal Lath and Metal Studs

Thin, plain or ribbed concrete, non-bearing exterior curtain walls built of standard channel iron studs are now being used in residential construction. *Figures 164-A and B* show a modern type of structural concrete frame with walls of this type.

In a steel frame building, for the non-bearing plain walls these studs are set at 12 to 16-inch centers and a solid wall 2½ inches thick is used. For the ribbed walls, the regular studs are set at 16-inch centers, but alternate studs are set double and held firmly together at 32-inch intervals to constitute reinforcement for vertical ribs at these points. *(Figure 165.)*

For either construction, Metal Lath is attached to one side of these studs which are plastered and back plastered or "*gunited*" with portland cement plaster. In the ribbed wall the minimum thickness between ribs is 2 inches; at the ribs the thickness is 3½ to 4 inches. Either type may be used with a structural steel frame as in *Figure 166*. A recently completed house of this general type is shown in *Figure 167*. They are also adapted to structural concrete framed buildings.

These houses, with a structural steel frame, have a ribbed concrete and Metal Lath exterior wall used in combination with a separate, interior plastered finish, making a double wall with heat insulation blanket of mineral wool or similar materials in the hollow space. Where ribs on the interior surface are not objectionable *(as in garages, storage rooms, etc.)*, and where the walls need not be insulated against heat losses *(as in the far south)*, the separate, furred interior Metal Lath and Plaster wall can be omitted with considerable economy. Additional details will be found in the booklet "*The Lurie Steel House*" sent on request by the publishers of this Handbook.

For Load Bearing Without Structural Frame

Thin walls, of concrete, Metal Lath and Channel Studs, when secured at the bottom to a concrete foundation, or to a reinforced masonry or steel floor, and at the top secured against lateral displacement by joists or other means, have, even without ribs, a surprisingly high bearing value, as determined by recent Armour Institute Tests. Thus supported they are ample to carry the usual roof without a separate structural frame.

However, in view of the effect of combined roof *(or ceiling)* loads and the horizontal load produced by wind stresses, the channel-reinforced ribbed construction, *Figure 168, is* recommended where a separate structural frame is not provided. The top of such thin walls should be designed to provide ample bearing for the roof and ceiling and ties to secure the top of the walls laterally.

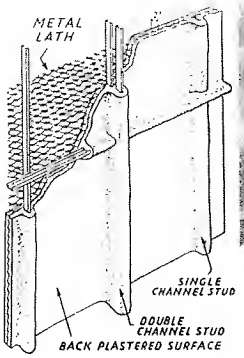


Fig. 165. Vertical and Horizontal Ribs Reinforce Wall.

Fig. 167. Small House with Concrete and Metal Lath Walls on Structural Steel Frame.

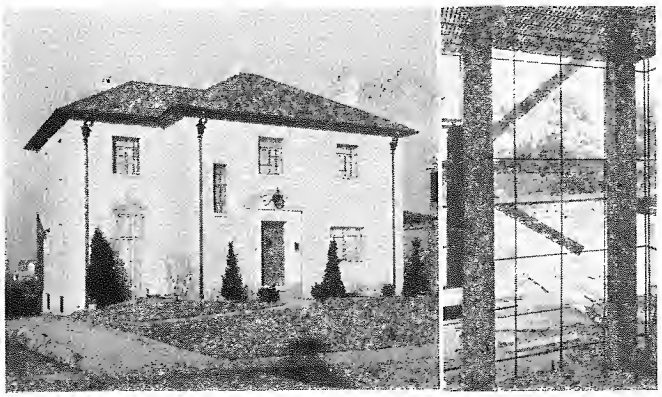


Fig. 164-A and B. Modern House with Metal Lath Used In Combination with Reinforced Concrete Structural Frame.

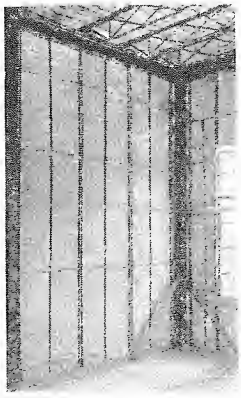


Fig. 166. Ribbed Concrete on Steel Frame.

Fig. 168. Channel and Metal Lath Reinforced Exterior Bearing Wall.

CHAPTER XXI

Metal Lath and Plaster Hollow Partitions; Details and Assembly Methods

Construction details used in the erection of Metal Lath and Plaster Hollow Partitions with metal studs in general closely parallel many of those already described in CHAPTERS XIII to XIX inclusive, for Metal Lath and Plaster Solid Partitions. However, there are some important differences which will now be discussed. Construction details for wood stud partitions are also described.

1. Studs and Spacings for Metal Lath Hollow Partitions

(See Specification 2; Articles A and B)

Studs for hollow partitions are of the single stud type, furnished prefabricated as units of partition thickness *(less the lathing and plastering on each side)*, occasionally are of rolled structural shapes, or are double rows of metal studs made into pairs by job assembly, using metal stiffeners between.

Single studs are prefabricated and furnished as units of standard width, from 2 to 6 inches, in a variety of assemblies made from strip steel, light hot-rolled steel sections, or steel rods, by punching or deforming and welding or by combinations of those processes. A number of representative types of such special studs are illustrated in *Plate III*, Page 92.

Studs of the prefabricated types are usually part of a partition system with top and bottom tracks or plates specially devised for rapidity of job assembly. *See Plates III and IV*, and therefore the respective manufacturers' specifications should be consulted regarding such accessories and methods of assembly.

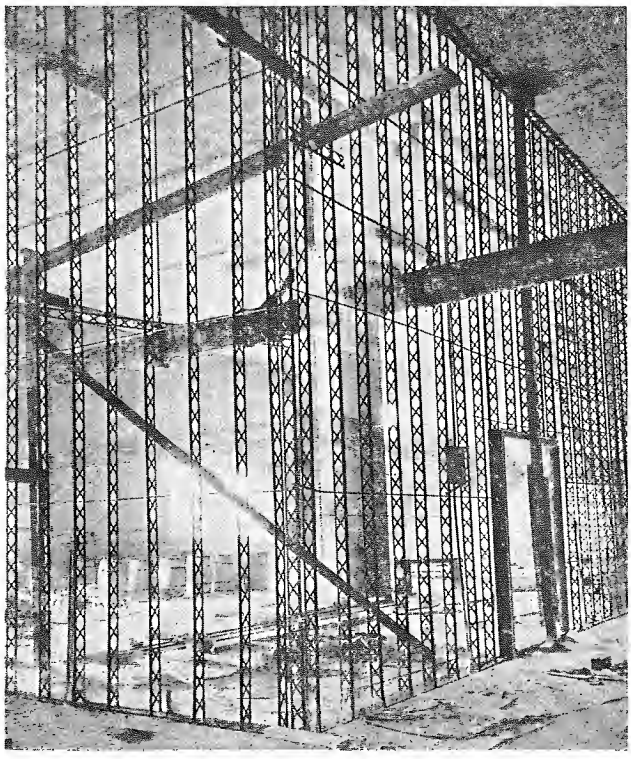
Hollow Partitions constructed of a double row of ¾-inch channels, either cold or hot-rolled, are provided with separators which also act as stiffeners, at intervals of two to four feet vertically between opposite pairs. *(See Figure 170.)*

Spreaders of 16 to 18-gauge steel come in various lengths to accommodate various thicknesses of partitions up to about 6 inches and are supplied by lath manufacturers. These separating devices permit clipping the channels together very rapidly. For deeper partitions requiring separators larger than 6 inches, spreaders are made of short lengths of ¾-inch channel or $\frac{3}{16}$-inch flat bars 1¼ to 2 inches wide. They are bent up "U"-shape and the ends wired to each of the pair of channels. In this manner partitions, furring or chases up to 30 inches deep are erected quickly and economically. For separations of more than 12 inches the heavier bars, or, preferably, ¾ or 1-inch channels are recommended.

Hollow partitions of the non-bearing type are also constructed with single channels, I-sections, or other shapes or welded strip steel formed into steel shapes usually 2 inches deep or more. The lath is applied each side and either wire-tied to the studs; or, in the case of specially fabricated studs, it is clipped or nailed to them by ordinary nails or wire ties or special devices furnished by the stud manufacturers.

For recommended heights see *Table III-A*; also manufacturers' catalogs.

Assembled by the various methods described, Metal Lath and Plaster Hollow Metal Stud Partitions can be built economically to heights as great as 30 feet or more, depending on depth and length of partition as shown in *Table III-A*.



No. 169. 19½-ft. High, 4-in. wide Prefabricated Studs, Metal Lath Hollow Partition — Post Office Terminal Annex, Los Angeles.

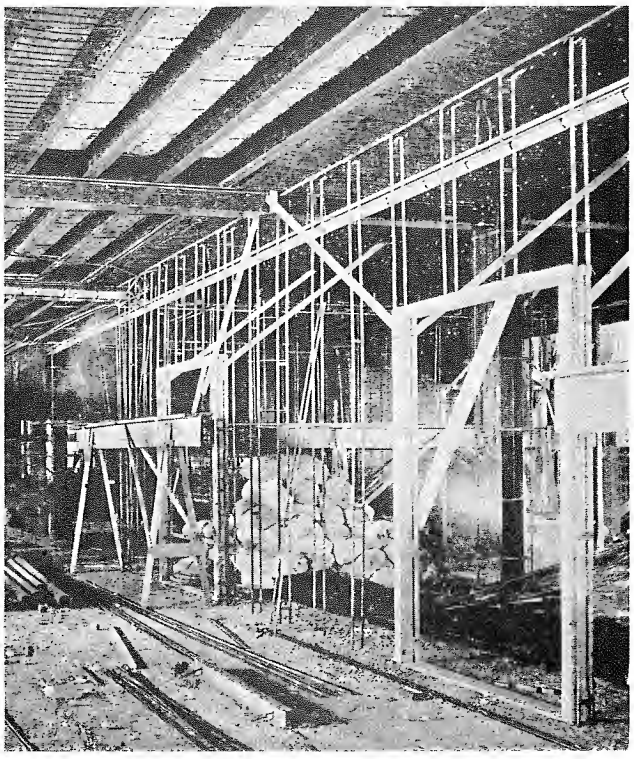
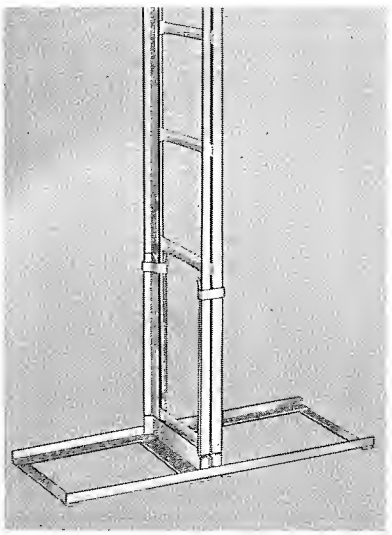


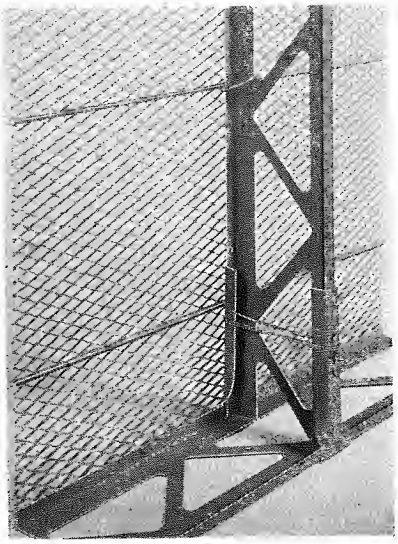
Fig. 170. Double ¾-Inch Channel Studs and Separators, Metal Lath Hollow Partition — Howard University, Home Economics Building, Washington, D. C.

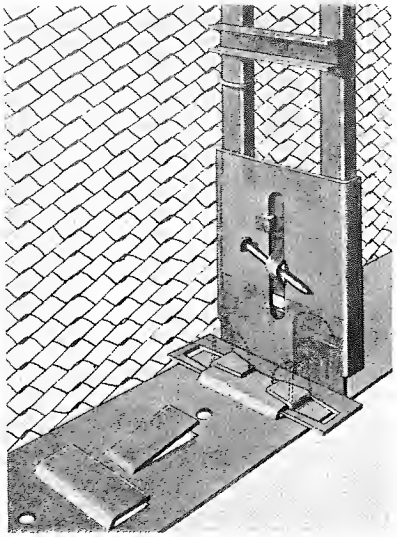
PLATE III

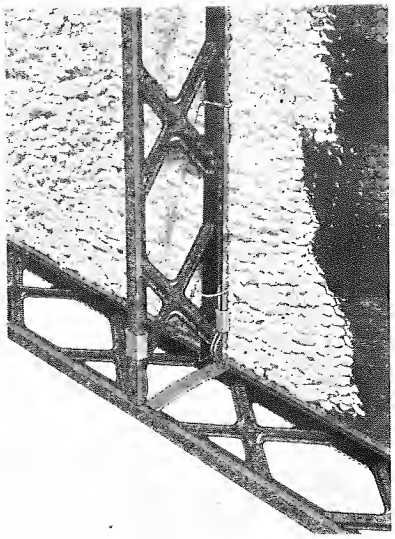
Various Types of Prefabricated Steel Studs,
And Floor and Ceiling Track Systems
For Metal Lath Hollow Partitions

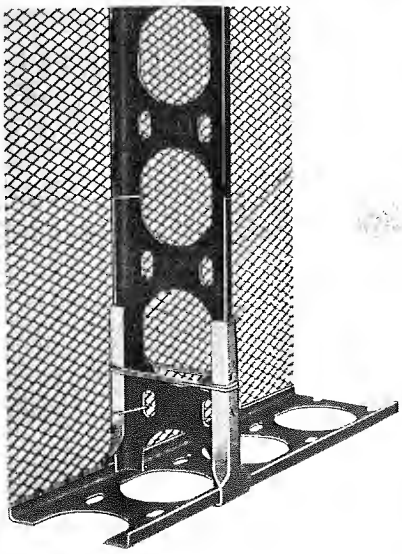
(Note: Studs lathed both sides for Hollow Partitions. Lathed on one side only (as illustrated) construction is used as Free Standing Furring.)

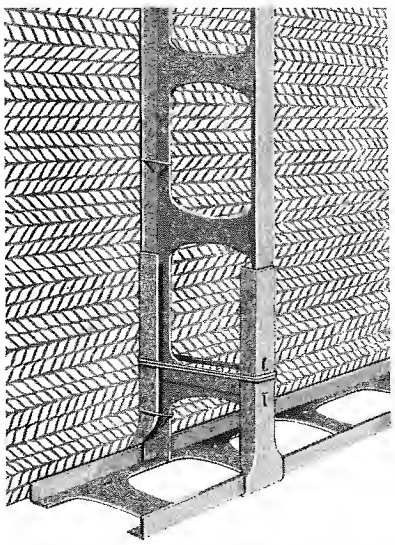


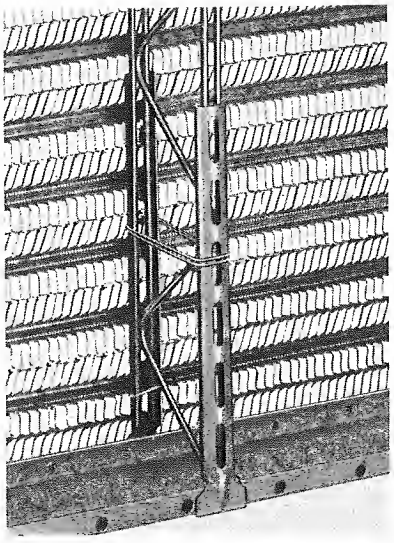












Hollow Partitions of Wood Studs and Metal Lath

For both bearing and non-bearing partitions the ordinary 2 x 4-inch wood stud placed 16 inches on centers, is commonly used. It usually rests on a 2 x 4-inch plate on the bottom and the top is capped with a single or double plate of the same size.

For fire-stopping, studs should be bridged with horizontal or herringbone wood bridging midway between floor and ceiling. However, for heights about 12 feet, two rows of bridging are recommended. Thus bridged, the construction will function as a bearing partition capable of carrying at least one floor above with a live load of 50 lbs. per sq. ft. For bearing purposes, 2 x 4-inch studs are not recommended for floor heights above 10 feet. For greater heights and where more than one floor is supported, 2 x 6-inch studs are recommended. It may also be necessary to reduce the stud spacing to 12 inches and increase the amount of bridging.

Wood studs should be doubled both sides of door openings, and openings greater than 4 feet should be trussed-over. Further details may be obtained from the *National Lumber Manufacturers' Association*, Washington, D. C.

TABLE III-A. Permissible Heights of Metal Lath and Metal Stud Hollow Non-Bearing Partitions.

Type	Face-to-Face Plaster Thickness in Inches (A)	Maximum Height (B) in Feet
Single Row of 2-Inch Studs	3½	20
Single Row of 3-Inch Studs	4½	26
Single Row of 4-Inch Studs	5½	32
Single Row of 6-Inch Studs	7½	36
Double Row of ¾-Inch Channels	3	18
Double Row of ¾-Inch Channels	4	24
Double Row of ¾-Inch Channels	5	30

(A) Plaster thickness ¾-inch from face of studs. For ⅝-inch thickness, reduce dimensions in this column ¼-inch. For ⅜-inch Rib Lath, with ribs against studs, increase face-to-face dimensions ½-inch.

(B) For lengths not exceeding 1½ times height. For lengths exceeding this, reduce height 20%.

Note: A ¾-inch horizontal stiffener channel with web horizontal should be placed every 4 to 6 feet horizontally for all hollow partitions more than 10 feet long and those more than 9 feet high. For unsupported heights of 20 feet or more, stiffeners should be 1½-inch horizontal channels. These stiffeners to be placed on inside of partitions and to remain tied to studs on at least one side of partition, as permanent reinforcement.

Load bearing Hollow Partitions are constructed of Metal Lath and Plaster using standard or special sections for the stud assemblies. For further information on load bearing, spacing, permissible heights, etc., apply to manufacturers.

2. Stud Spacings Along Face of Partition

The spacing of studs along the face of hollow partitions is governed by the stiffness of lath between supports. Since the lath is not back-plastered as in Solid Metal Lath Partitions, the permissible spacings for some types and weights of lath are slightly less than shown for that type of partition. The spacings in TABLE IV-A should be used, except where manufacturers of partition stud systems recommend otherwise for their particular systems.

TABLE IV-A. Weights of Metal Lath and Corresponding Spacings For Studs For Metal Lath Hollow Partitions.

TYPE OF LATH	Weight, Lbs., Per Sq. Yd.	Spacing of Metal Stud Supports, In.
Flat Expanded Lath	2.5	12*
	3.0	13½*
	3.4	16
Flat Rib Lath	2.75	16
	3.0	16
	3.4	19
	4.0	24
⅜" Rib Lath or Lath of Equal Rigidity	3.0	24
	3.4	31½
	4.0	31½
Sheet Lath	4.5	24

* Permissible spacing: 16 inches for wood stud partitions.

3. Lathing On Hollow Partitions

For Hollow Partitions two Metal Lath surfaces are supplied — one for each face of the partition. *(See* PLATE IV.) Order of placing, methods of lapping and tying are the same on each face for double row channel stud and for wood stud hollow partitions, as described

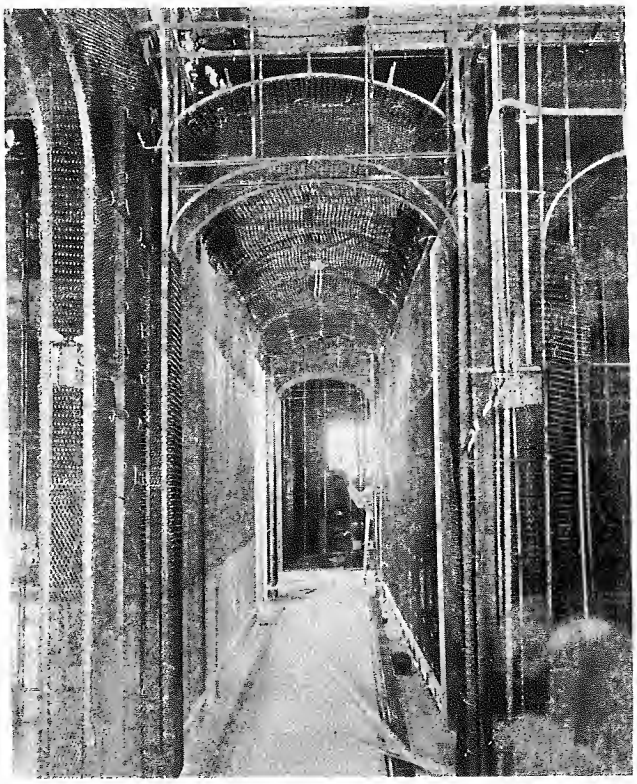


Fig. 171. Lathing Detail for Arched Corridor Using Metal Lath Hollow Partition, Earl J. McMahon Residence, Long Beach, Ind.
Charles H. Lenske and J. Raymond La Thomas, Arch'ts.

XXII Double Partition Details
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PLATE IV

Illustrating Adaptability of Metal Lath Hollow Partitions

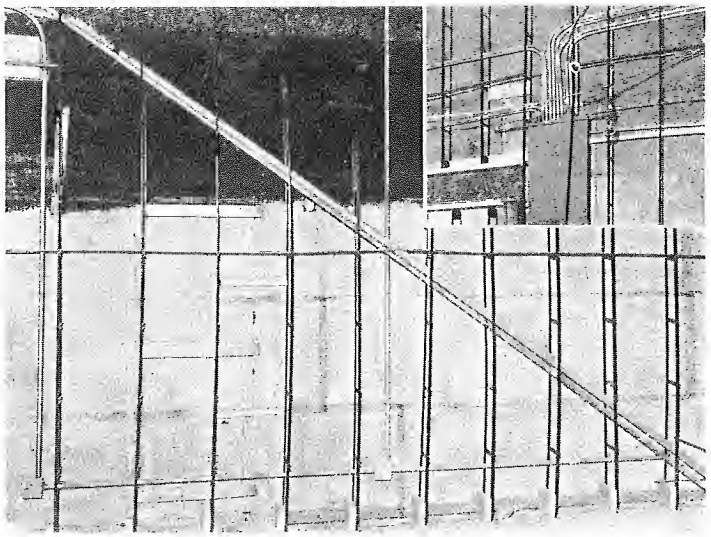
(TOP, RIGHT) Length of Runs Shortened and Chase Cutting Eliminated Because of Unlimited Range of Location Permitted for Conduit; in RETAIL STORES.

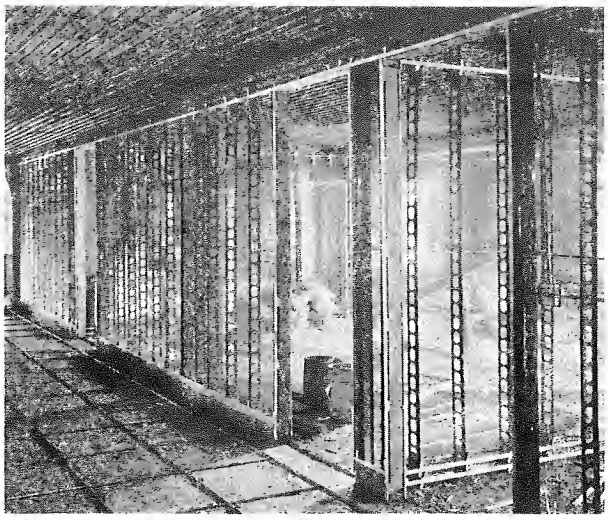
(LEFT, CENTER) Strip Grounds at Floor and Ceiling Nailed to Wood Blocks Attached to One-Piece Hollow Studs; also Cost-Saving Metal Lath Ceiling; in SCHOOL CONSTRUCTION.

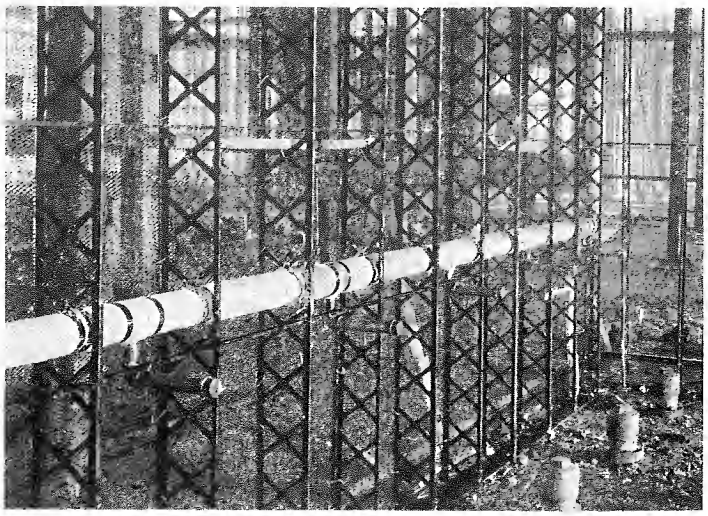
(RIGHT, CENTER) Protected Supply Pipes Completely Housed In and Supported by Single Prefabricated Stud Partition; in POST OFFICE BUILDING.

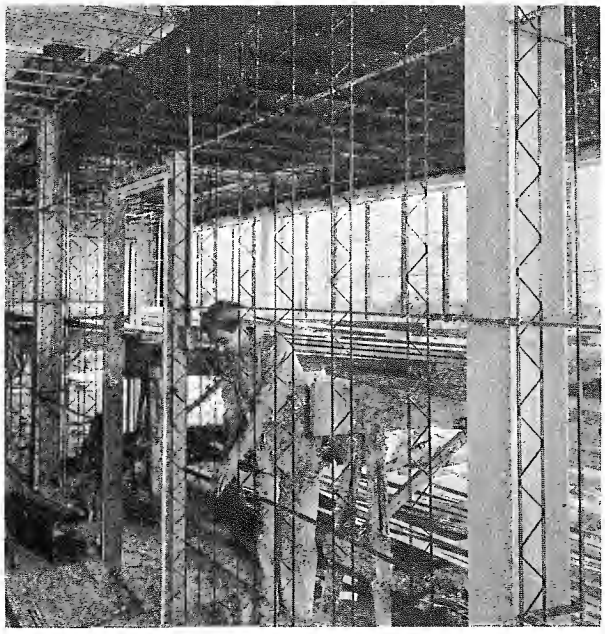
(BOTTOM, LEFT) Attachment to Wood Door Bucks, Ease of Framing Around Structural Steel Columns, etc.; in OFFICE BUILDING.

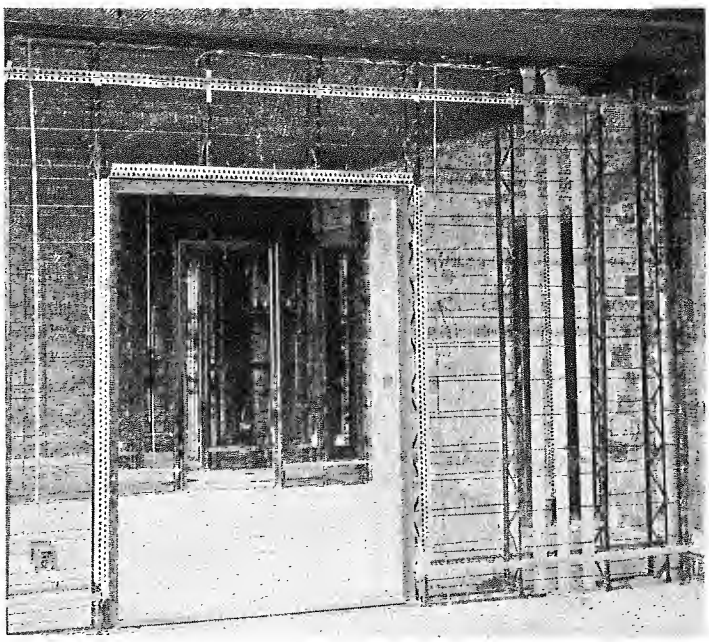
(BOTTOM, RIGHT) Illustrating Application of Concealed Picture Mould and Wide Flanged Metal Corner Beads for Cased Opening; in HOSPITAL BUILDING.











in CHAPTER XV, for Solid Partitions.

However, where *patented stud* Hollow Partitions, and where special clips or lath attachment devices are used, manufacturers' specifications should be consulted.

A typical arrangement of prefabricated studs at a corner and at intersections of two partitions is shown in *Figure 177*.

4. Wood Grounds, Metal Base Screeds, etc., for Metal Lath Hollow Partitions

(See Specification 2, Article H)

For these partitions many of the details or devices described in CHAPTER XVI for grounds on Solid Partitions may be used.

In wide, single-stud Hollow Partitions a single, wide nailing block, *Figure 179*, usually a piece of 2 x 4 is attached to the face of each stud, see upper left, upper right and lower right illustrations in PLATE IV. Short, left-over pieces of odd dimension may be used (*See Figure 180-A*). Occasionally, where studs are spaced 12 to 16 inches on center, and are quite rigid, nailing blocks are used only on alternate studs.

Strip grounds are nailed to the blocking, *Figure 179*, as required for base board, PLATE IV, or direct to the studs as in *Figure 180-B*.

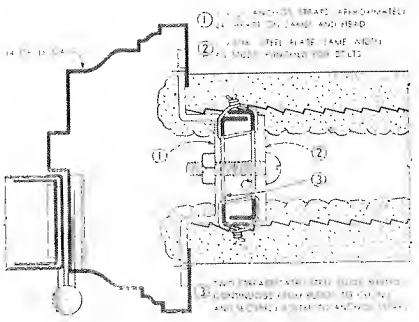


Fig. 172. Combined Metal Frame, Buck and Molded Trim showing attachment of Prefabricated Metal Studs.

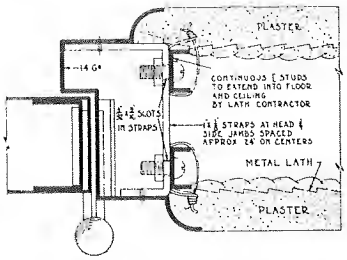


Fig. 174. Flush Combined Metal Frame and Trim with Plaster Mould.

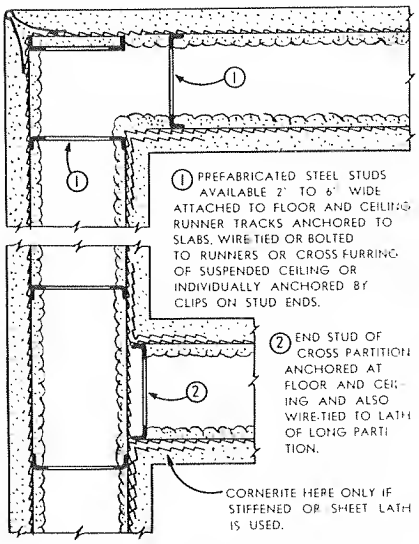


Fig. 177. Diagram Showing Typical Arrangement of Metal Studs at Wall Corners and Partition intersections.

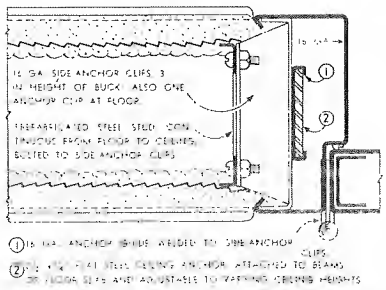


Fig. 173. Combined Metal Frame, Buck and Flush Trim with Prefabricated Metal Stud, and Ceiling Anchors.

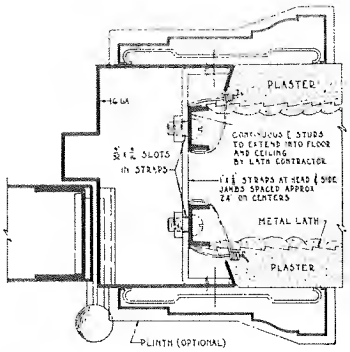


Fig. 175. Combined Buck and Jamb with Clipped-on Metal Casing.

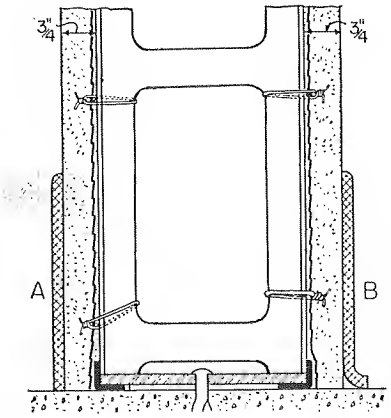


Fig. 178. Rubber or Asphalt Tile Base Details for Metal Lath and Plaster Hollow Partitions.
A—Straight Base. B—Cove Base.

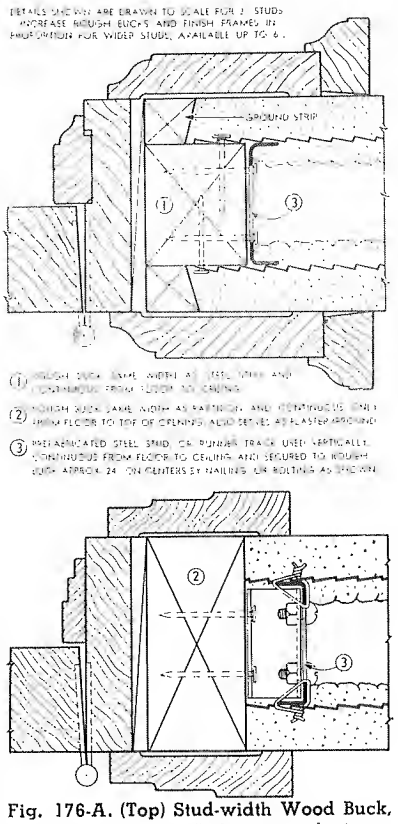


Fig. 176-A. (Top) Stud-width Wood Buck, Continuous to Ceiling; wood trim.
Fig. 176-B. (Above) Partition-width Wood Buck, Continuous only to Top of Opening; wood trim.

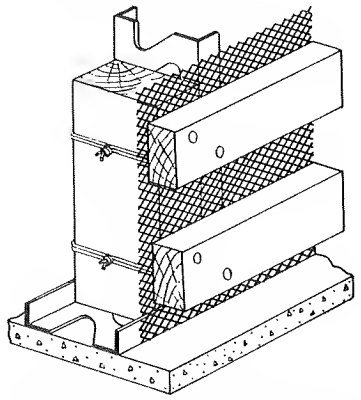


Fig. 179. Typical Arrangement of Wood Blocking and Strip Grounds for Metal Stud Hollow Partitions.

Where the double row system of ¾-inch channels is used, small nailing blocks as in *Figure 124-B* are applied on each row of channels.

For Hollow Metal Stud Partitions, metal corner beads, screeds and molds are attached over the lath and only to the nearest face of the studs, and aligned as for Solid Partitions.

5. Metal Frames and Trim for Metal Lath Hollow Partitions

(See Specification 2, Article G)

Because prefabricated studs provide practically continuous and positive anchorage up and down the whole openings for metal bucks, special combined metal frame, buck and trim is now available. Such a typical detail with moulded trim is shown in *Figure 172*. In addition, any of the combined or separate buck jamb and trim details used for masonry partition construction may, when modified as to anchorage to the partition, be used with Metal Lath Hollow Partitions.

A detail with flush trim and plaster ground used for housing, hospitals, etc., *Figure 173*, provides direct anchor connections between the frame and a typical one-piece prefabricated stud. It also has an adjustable bar anchor to the ceiling slab, although in many cases such anchors are omitted, especially for openings with wide jambs.

Figure 174 shows another buck, this with a plaster bead. The detail in *Figure 175* is that of a combination frame with clipped-on-ornamental casing. Although these last two details show double-stud construction, they are equally adapted for use with prefabricated studs.

Whether single or double prefabricated studs are to be used adjacent to and as anchorage for bucks, depends on job conditions, and also on the type of stud used. In most instances only a single stud is needed. However, the specifications of the stud manufacturers should be consulted.

A partial list of manufacturers of metal door frames, bucks, etc., is given in the APPENDIX. Others will be found listed in Sweet's Catalogue.

6. Wood Trim for Hollow Partitions

No special mention need be made of wood jamb and casing details for Metal Lath Hollow Partitions as any type used for partitions 3½ inches thick and more may be readily adapted for this purpose. Typical details are shown in *Figures 176-A* and *176-B* and a typical installation in PLATE IV, lower left illustration. Many of those described for Solid Partitions may also be used for Hollow Partitions merely by increasing the size of the jamb and buck.

7. Installation of Electrical Devices, Piping, Ducts, etc., In Hollow Partitions

The continuous hollow space afforded by the various types of prefabricated-stud and double-stud partitions and the availability of the studs for direct attachment of the conduit, (see upper right illustration in PLATE IV and also *Figure 181*) and for the alignment of outlet and switch boxes, etc., entirely eliminates costly cutting of pipe chases, as in masonry, etc. This practically unlimited flexibility of installation is an important construction cost advantage of the *hollow type* of Metal Lath Partition.

Devices used in electrical installations in other types of partitions are also employed in Metal Lath Hollow Partitions.

The same ease of operation confronts the contractor in the installation of plumbing and heating ducts, details of which are described in CHAPTER XVI, and also illustrated in PLATE IV and *Figure 180-A*.

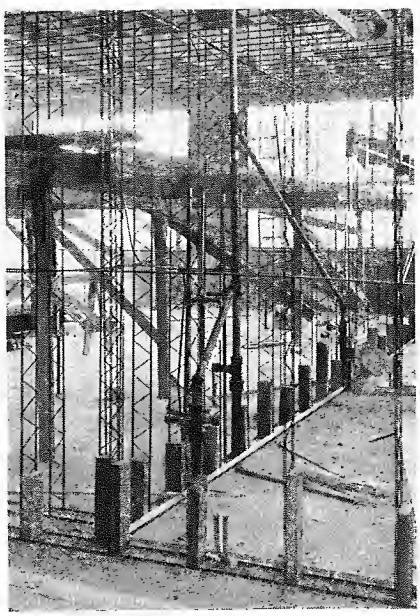


Fig. 180-A. Intersecting Hollow Partitions Showing Blocking for Grounds. Washington Grammar School, Bakersfield, Cal. Symmes and Willard, Archts.

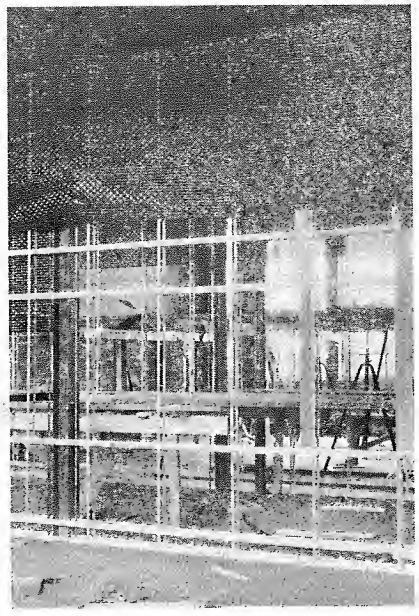


Fig. 180-B. Grounds for Blackboard and and Trim on Metal Stud, and Metal Lath Hollow Partition. Mill Creek School, Erie, Pa. Fred A. Fuller, Archt.

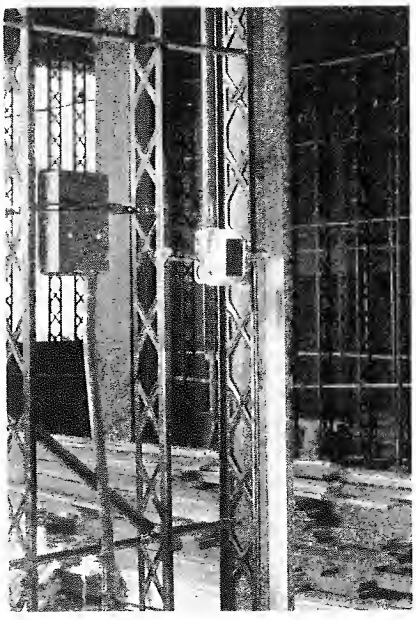


Fig. 181. Conduit, Outlet, and Switch Box In Metal Lath Hollow Partition. Mark Keppel High School, Administration Building, Alhambra, Cal. Marston and Maybury, Archts.

CHAPTER XXII

Metal Lath Double Partitions Details and Assembly Methods

Construction details used in the erection of Metal Lath Double Partitions closely parallel those already described in CHAPTER XXI for Double Row Metal Lath Hollow Partitions. However, there are some important differences which merit attention.

1. Studs for Metal Lath Double Partitions

(See Specification 3, Article B)

For these a double row of standard ¾-inch channel studs 12 inches on center are recommended. Cross braces or separators, connecting the rows on opposite sides, are not used because they help transmit sound, therefore the studs are reinforced where necessary by 1-inch horizontal channel stiffeners placed with the web horizontal in the hollow space and wired permanently to the studs. *(Figure 182.)* These stiffeners may be omitted for partitions under 8 feet in height provided wide flanged ¾-inch channels or standard 1-inch channels are used for studs. However stiffeners are recommended for best results where rigidity is essential and for partitions more than 8 feet high and for those over 10 feet long.

Independent sets of horizontal channels are used for each row of studs and should be spaced not to exceed 4 feet on center vertically, at least two being provided for partitions 9½ feet high, or over. They should be placed so that no parts come in contact with any part of the partition on the opposite side and so they touch no conduits, service piping, ducts or similar construction which would function as a source or carrier of sound.

The distance between faces of these sound-insulating partitions depends on the degree of insulation desired. However as pointed out in CHAPTER VI, *Page 41*, marked increases in depth do not add materially to the sound insulation value, and, all things con-

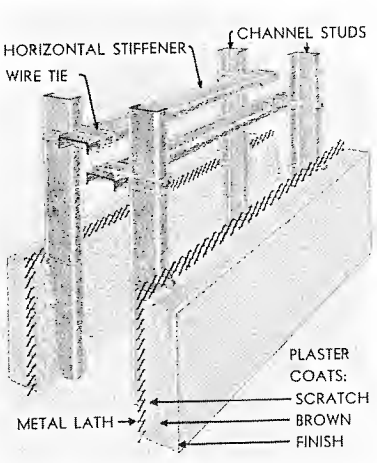


Fig. 182. Arrangement of Double Channels and Stiffeners for Sound Insulating Partitions.

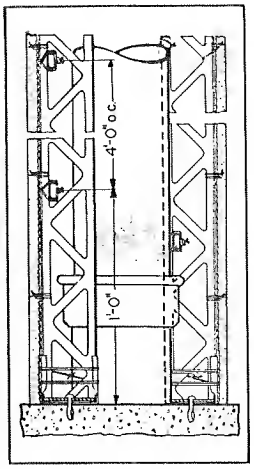


Fig. 183. Double and Staggered Prefabricated Studs.

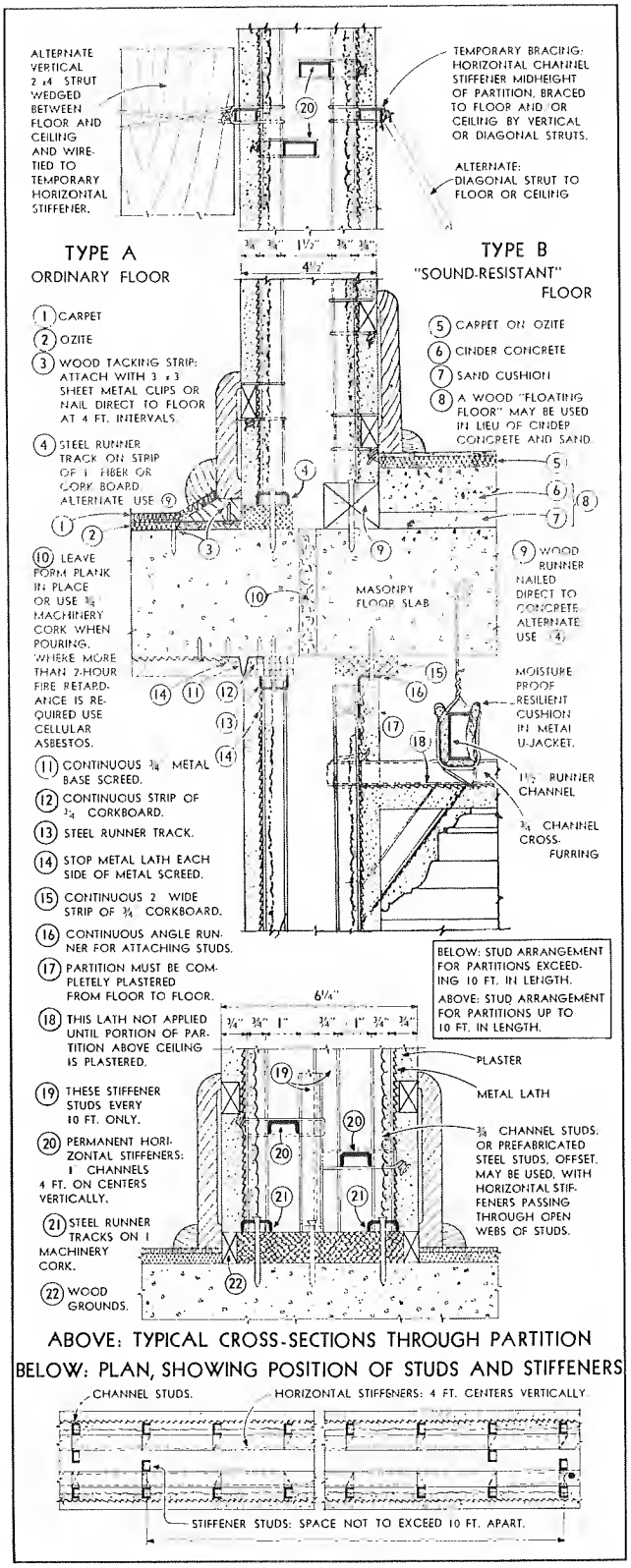


Fig. 184. Insulation Details of Metal Lath Double Partitions In Ordinary and Sound-Insulated Floor and Ceiling Construction, Showing Insulation of Runner Tracks.

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Bracing for Plastering

Temporary braces are set against the rib side of the sheets at approximately 5-feet centers. These braces are horizontal for the usual vertical ribs. From these braces others are run diagonally to temporary wood strips on the floor or ceiling. Braces are removed when the scratch coat on the opposite side of the partition has set.

4. Curtain Walls, Exteriors of Small Buildings, Fences, etc.

Since curtain and spandrel walls do not bear weight, deep-rib reinforced walls 2 inches or more thick have found a wide use in industrial buildings. *(See Figure 163.)* Because of their shallow depth they are particularly adapted for use as a fill-in for the space between exterior columns and windows. Whether the frame be structural steel, or reinforced concrete, the deep-rib wall is readily attached thereto; in the case of steel it is attached by special clips or wire ties to standard structural angles and in the other, angle runners or slots, as described in Article 3 for partition construction, are used.

For smaller structures such as small residences, filling stations, farm structures, tourist-camps, out-buildings, etc., side walls and roofs are built with Deep-Rib Lath and portland cement plaster using a light steel or wood frame.

In all cases where Deep-Rib Lath is used for out-door construction it is important that in all exterior exposures it be covered with not less than 1-inch of concrete stucco or portland cement plastering, and that these mixtures, except for the last or finish coat be neither richer nor leaner than 1:3. A water-proofed finish coat is recommended.

5. Thin Concrete Exterior Walls of Metal Lath and Metal Studs

Thin, plain or ribbed concrete, non-bearing exterior curtain walls built of standard channel iron studs are now being used in residential construction. *Figures 164-A and B* show a modern type of structural concrete frame with walls of this type.

In a steel frame building, for the non-bearing plain walls these studs are set at 12 to 16-inch centers and a solid wall 2½ inches thick is used. For the ribbed walls, the regular studs are set at 16-inch centers, but alternate studs are set double and held firmly together at 32-inch intervals to constitute reinforcement for vertical ribs at these points. *(Figure 165.)*

For either construction, Metal Lath is attached to one side of these studs which are plastered and back plastered or "*gunited*" with portland cement plaster. In the ribbed wall the minimum thickness between ribs is 2 inches; at the ribs the thickness is 3½ to 4 inches. Either type may be used with a structural steel frame as in *Figure 166*. A recently completed house of this general type is shown in *Figure 167*. They are also adapted to structural concrete framed buildings.

These houses, with a structural steel frame, have a ribbed concrete and Metal Lath exterior wall used in combination with a separate, interior plastered finish, making a double wall with heat insulation blanket of mineral wool or similar materials in the hollow space. Where ribs on the interior surface are not objectionable *(as in garages, storage rooms, etc.)*, and where the walls need not be insulated against heat losses *(as in the far south)*, the separate, furred interior Metal Lath and Plaster wall can be omitted with considerable economy. Additional details will be found in the booklet "*The Lurie Steel House*" sent on request by the publishers of this Handbook.

For Load Bearing Without Structural Frame

Thin walls, of concrete, Metal Lath and Channel Studs, when secured at the bottom to a concrete foundation, or to a reinforced masonry or steel floor, and at the top secured against lateral displacement by joists or other means, have, even without ribs, a surprisingly high bearing value, as determined by recent Armour Institute Tests. Thus supported they are ample to carry the usual roof without a separate structural frame.

However, in view of the effect of combined roof *(or ceiling)* loads and the horizontal load produced by wind stresses, the channel-reinforced ribbed construction, *Figure 168, is* recommended where a separate structural frame is not provided. The top of such thin walls should be designed to provide ample bearing for the roof and ceiling and ties to secure the top of the walls laterally.

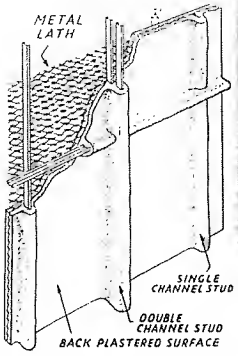


Fig. 165. Vertical and Horizontal Ribs Reinforce Wall.

Fig. 167. Small House with Concrete and Metal Lath Walls on Structural Steel Frame.

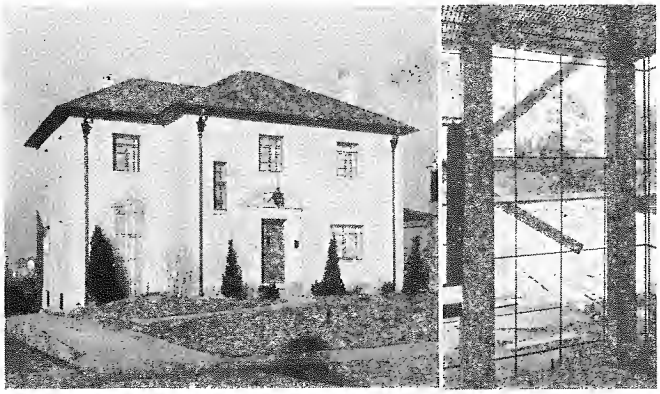


Fig. 164-A and B. Modern House with Metal Lath Used In Combination with Reinforced Concrete Structural Frame.

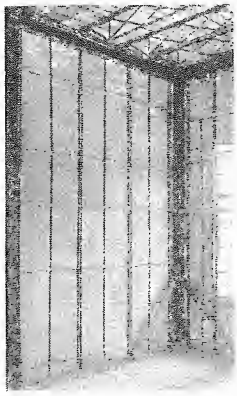


Fig. 166. Ribbed Concrete on Steel Frame.

Fig. 168. Channel and Metal Lath Reinforced Exterior Bearing Wall.

CHAPTER XXI

Metal Lath and Plaster Hollow Partitions; Details and Assembly Methods

Construction details used in the erection of Metal Lath and Plaster Hollow Partitions with metal studs in general closely parallel many of those already described in CHAPTERS XIII to XIX inclusive, for Metal Lath and Plaster Solid Partitions. However, there are some important differences which will now be discussed. Construction details for wood stud partitions are also described.

1. Studs and Spacings for Metal Lath Hollow Partitions

(See Specification 2; Articles A and B)

Studs for hollow partitions are of the single stud type, furnished prefabricated as units of partition thickness *(less the lathing and plastering on each side)*, occasionally are of rolled structural shapes, or are double rows of metal studs made into pairs by job assembly, using metal stiffeners between.

Single studs are prefabricated and furnished as units of standard width, from 2 to 6 inches, in a variety of assemblies made from strip steel, light hot-rolled steel sections, or steel rods, by punching or deforming and welding or by combinations of those processes. A number of representative types of such special studs are illustrated in *Plate III*, Page 92.

Studs of the prefabricated types are usually part of a partition system with top and bottom tracks or plates specially devised for rapidity of job assembly. *See Plates III and IV*, and therefore the respective manufacturers' specifications should be consulted regarding such accessories and methods of assembly.

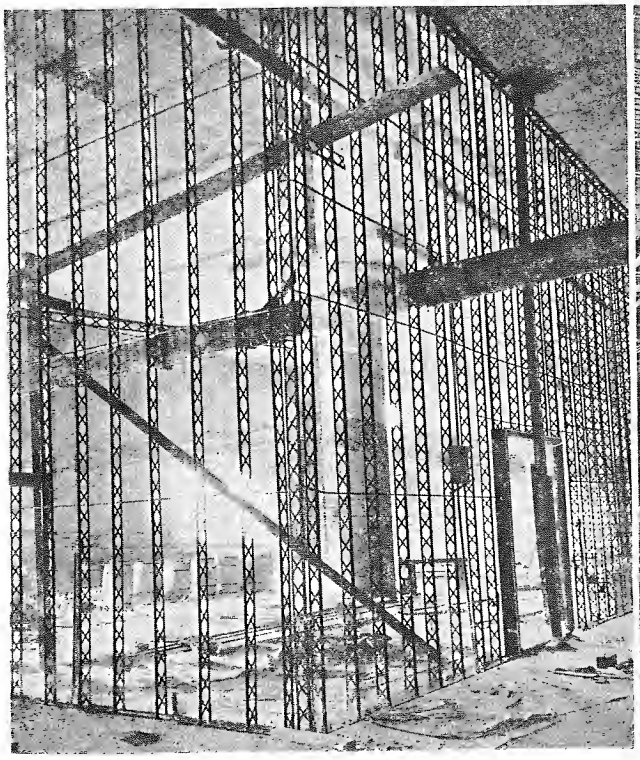
Hollow Partitions constructed of a double row of ¾-inch channels, either cold or hot-rolled, are provided with separators which also act as stiffeners, at intervals of two to four feet vertically between opposite pairs. *(See Figure 170.)*

Spreaders of 16 to 18-gauge steel come in various lengths to accommodate various thicknesses of partitions up to about 6 inches and are supplied by lath manufacturers. These separating devices permit clipping the channels together very rapidly. For deeper partitions requiring separators larger than 6 inches, spreaders are made of short lengths of ¾-inch channel or $\frac{3}{16}$-inch flat bars 1¼ to 2 inches wide. They are bent up "U"-shape and the ends wired to each of the pair of channels. In this manner partitions, furring or chases up to 30 inches deep are erected quickly and economically. For separations of more than 12 inches the heavier bars, or, preferably, ¾ or 1-inch channels are recommended.

Hollow partitions of the non-bearing type are also constructed with single channels, I-sections, or other shapes or welded strip steel formed into steel shapes usually 2 inches deep or more. The lath is applied each side and either wire-tied to the studs; or, in the case of specially fabricated studs, it is clipped or nailed to them by ordinary nails or wire ties or special devices furnished by the stud manufacturers.

For recommended heights see *Table III-A*; also manufacturers' catalogs.

Assembled by the various methods described, Metal Lath and Plaster Hollow Metal Stud Partitions can be built economically to heights as great as 30 feet or more, depending on depth and length of partition as shown in *Table III-A*.



No. 169. 19½-ft. High, 4-in. wide Prefabricated Studs, Metal Lath Hollow Partition — Post Office Terminal Annex, Los Angeles.

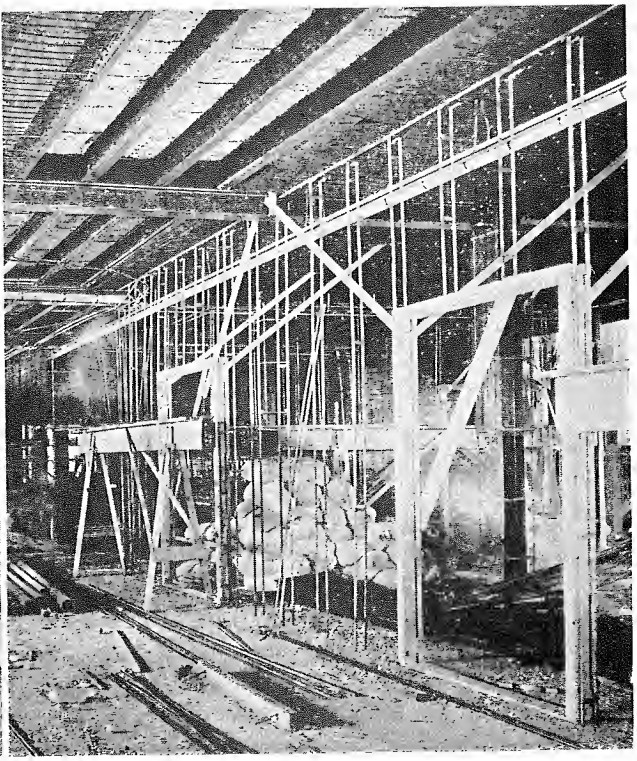
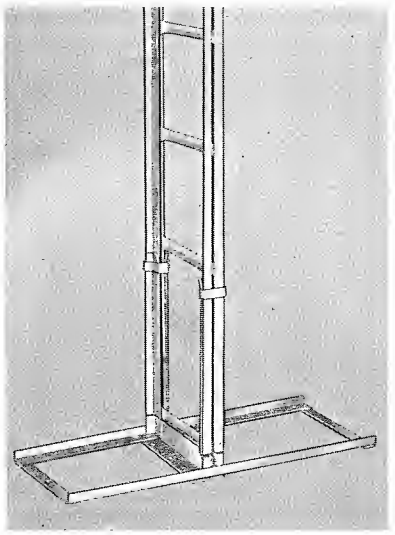


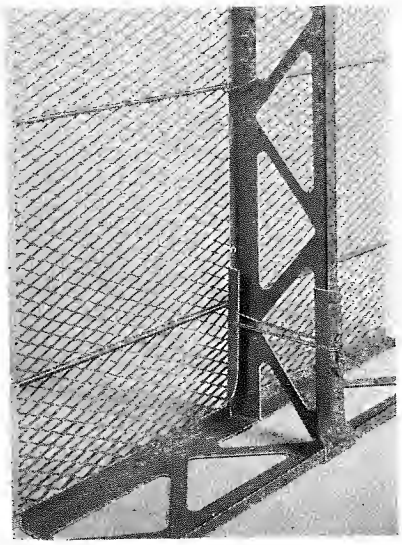
Fig. 170. Double ¾-Inch Channel Studs and Separators, Metal Lath Hollow Partition — Howard University, Home Economics Building, Washington, D. C.

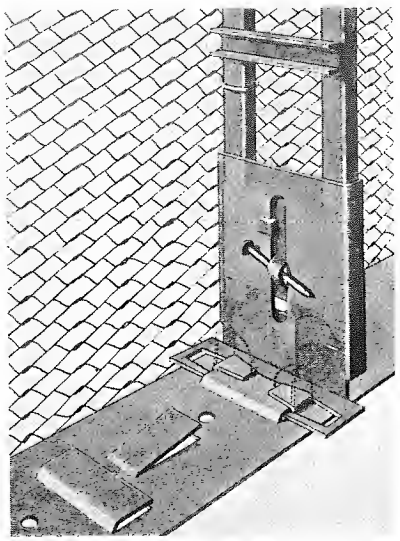
PLATE III

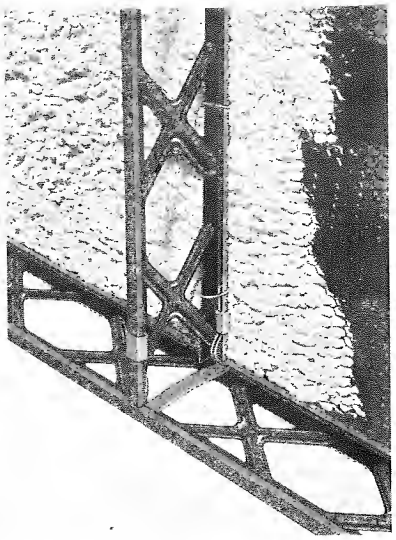
Various Types of Prefabricated Steel Studs,
And Floor and Ceiling Track Systems
For Metal Lath Hollow Partitions

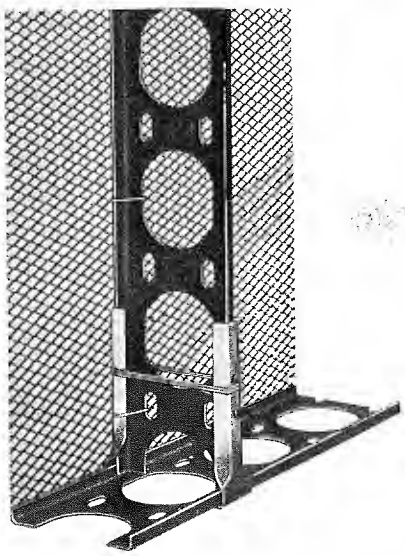
(Note: Studs lathed both sides for Hollow Partitions. Lathed on one side only (as illustrated) construction is used as Free Standing Furring.)

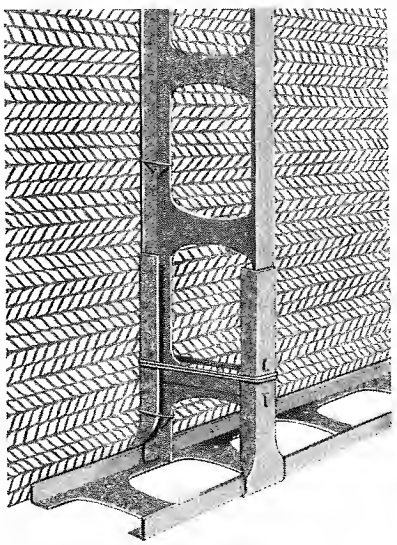


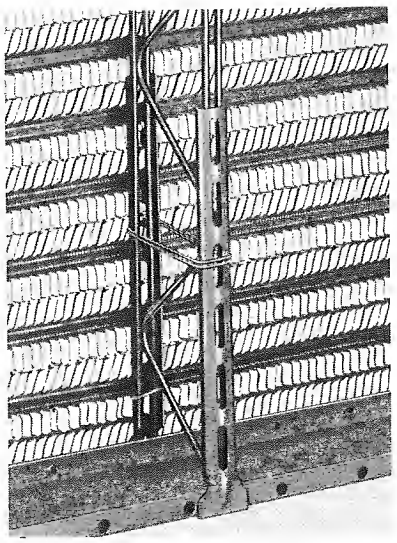












Hollow Partitions of Wood Studs and Metal Lath

For both bearing and non-bearing partitions the ordinary 2 x 4-inch wood stud placed 16 inches on centers, is commonly used. It usually rests on a 2 x 4-inch plate on the bottom and the top is capped with a single or double plate of the same size.

For fire-stopping, studs should be bridged with horizontal or herringbone wood bridging midway between floor and ceiling. However, for heights about 12 feet, two rows of bridging are recommended. Thus bridged, the construction will function as a bearing partition capable of carrying at least one floor above with a live load of 50 lbs. per sq. ft. For bearing purposes, 2 x 4-inch studs are not recommended for floor heights above 10 feet. For greater heights and where more than one floor is supported, 2 x 6-inch studs are recommended. It may also be necessary to reduce the stud spacing to 12 inches and increase the amount of bridging.

Wood studs should be doubled both sides of door openings, and openings greater than 4 feet should be trussed-over. Further details may be obtained from the *National Lumber Manufacturers' Association*, Washington, D. C.

TABLE III-A. Permissible Heights of Metal Lath and Metal Stud Hollow Non-Bearing Partitions.

Type	Face-to-Face Plaster Thickness in Inches (A)	Maximum Height (B) in Feet
Single Row of 2-Inch Studs	3½	20
Single Row of 3-Inch Studs	4½	26
Single Row of 4-Inch Studs	5½	32
Single Row of 6-Inch Studs	7½	36
Double Row of ¾-Inch Channels	3	18
Double Row of ¾-Inch Channels	4	24
Double Row of ¾-Inch Channels	5	30

(A) Plaster thickness ¾-inch from face of studs. For ⅝-inch thickness, reduce dimensions in this column ¼-inch. For ⅜-inch Rib Lath, with ribs against studs, increase face-to-face dimensions ½-inch.

(B) For lengths not exceeding 1½ times height. For lengths exceeding this, reduce height 20%.

Note: A ¾-inch horizontal stiffener channel with web horizontal should be placed every 4 to 6 feet horizontally for all hollow partitions more than 10 feet long and those more than 9 feet high. For unsupported heights of 20 feet or more, stiffeners should be 1½-inch horizontal channels. These stiffeners to be placed on inside of partitions and to remain tied to studs on at least one side of partition, as permanent reinforcement.

Load bearing Hollow Partitions are constructed of Metal Lath and Plaster using standard or special sections for the stud assemblies. For further information on load bearing, spacing, permissible heights, etc., apply to manufacturers.

2. Stud Spacings Along Face of Partition

The spacing of studs along the face of hollow partitions is governed by the stiffness of lath between supports. Since the lath is not back-plastered as in Solid Metal Lath Partitions, the permissible spacings for some types and weights of lath are slightly less than shown for that type of partition. The spacings in TABLE IV-A should be used, except where manufacturers of partition stud systems recommend otherwise for their particular systems.

TABLE IV-A. Weights of Metal Lath and Corresponding Spacings For Studs For Metal Lath Hollow Partitions.

TYPE OF LATH	Weight, Lbs., Per Sq. Yd.	Spacing of Metal Stud Supports, In.
Flat Expanded Lath	2.5	12*
	3.0	13½*
	3.4	16
Flat Rib Lath	2.75	16
	3.0	16
	3.4	19
	4.0	24
⅜" Rib Lath or Lath of Equal Rigidity	3.0	24
	3.4	31½
	4.0	31½
Sheet Lath	4.5	24

* Permissible spacing: 16 inches for wood stud partitions.

3. Lathing On Hollow Partitions

For Hollow Partitions two Metal Lath surfaces are supplied — one for each face of the partition. (*See* PLATE IV.) Order of placing, methods of lapping and tying are the same on each face for double row channel stud and for wood stud hollow partitions, as described

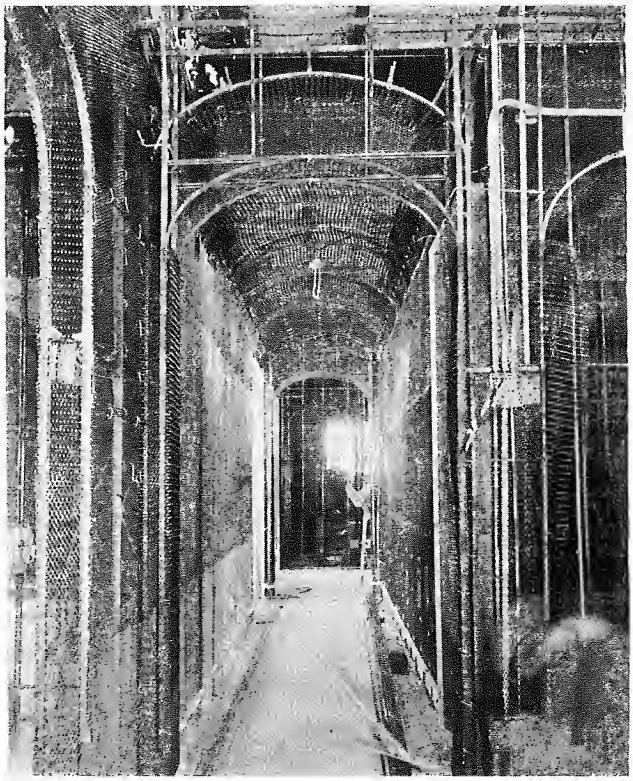


Fig. 171. Lathing Detail for Arched Corridor Using Metal Lath Hollow Partition, Earl J. McMahon Residence, Long Beach, Ind.
Charles H. Lenske and J. Raymond La Thomas, Arch'ts.

XXII Double Partition Details
XXIII Vertical Furring Details
XXIV Specifications
XXV Plastering, Estimating
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PLATE IV

Illustrating Adaptability of Metal Lath Hollow Partitions

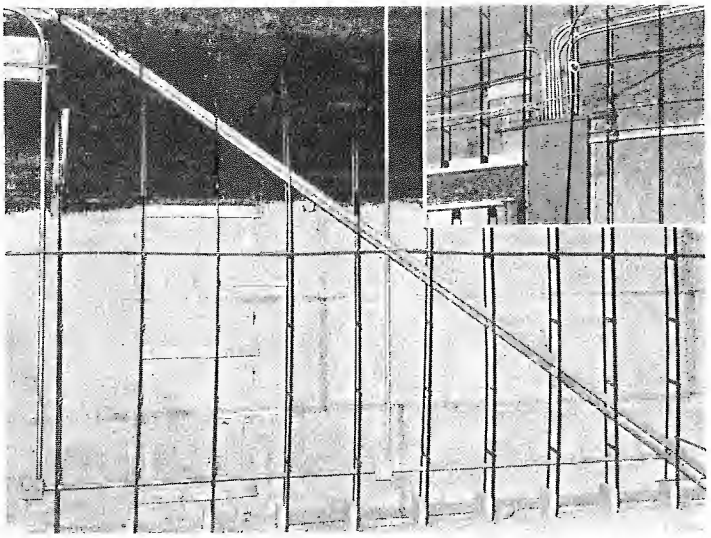
(TOP, RIGHT) Length of Runs Shortened and Chase Cutting Eliminated Because of Unlimited Range of Location Permitted for Conduit; in RETAIL STORES.

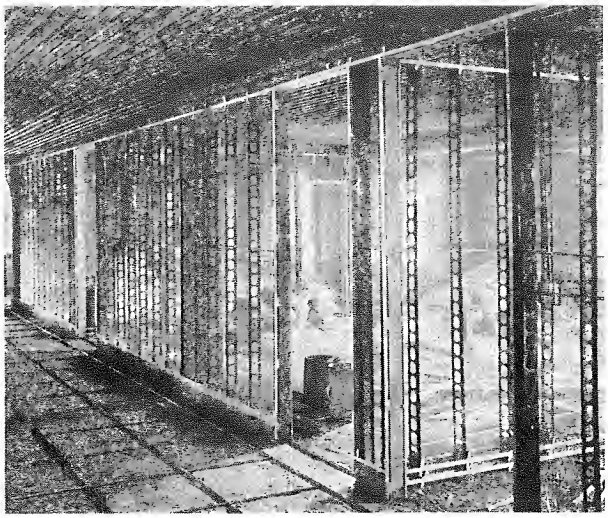
(LEFT, CENTER) Strip Grounds at Floor and Ceiling Nailed to Wood Blocks Attached to One-Piece Hollow Studs; also Cost-Saving Metal Lath Ceiling; in SCHOOL CONSTRUCTION.

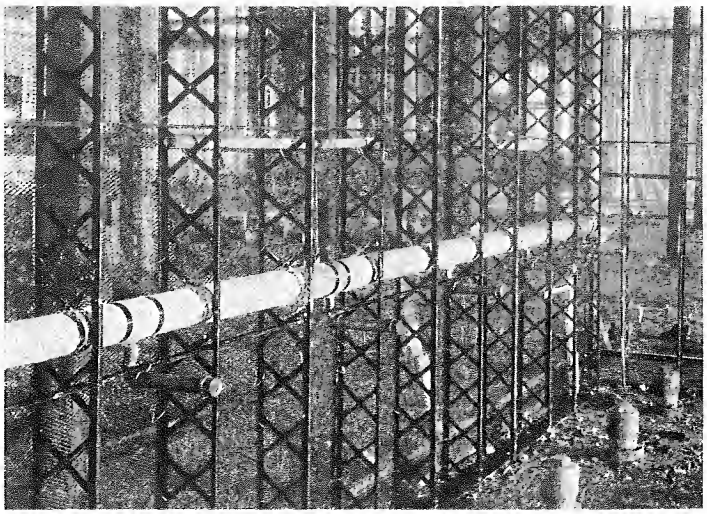
(RIGHT, CENTER) Protected Supply Pipes Completely Housed In and Supported by Single Prefabricated Stud Partition; in POST OFFICE BUILDING.

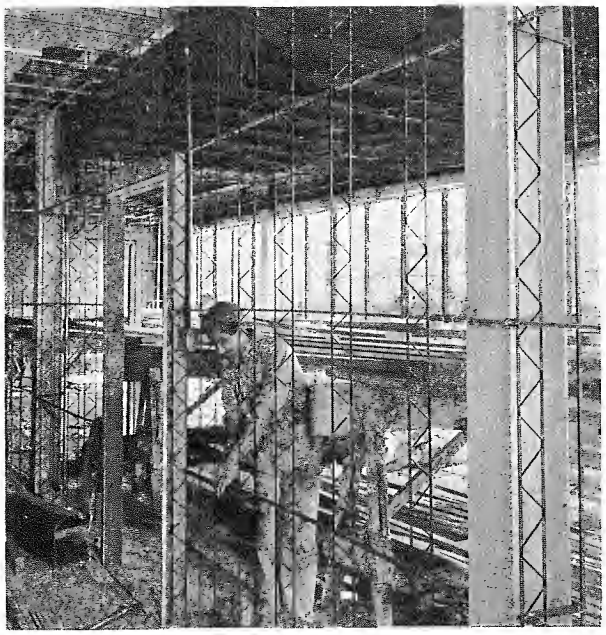
(BOTTOM, LEFT) Attachment to Wood Door Bucks, Ease of Framing Around Structural Steel Columns, etc.; in OFFICE BUILDING.

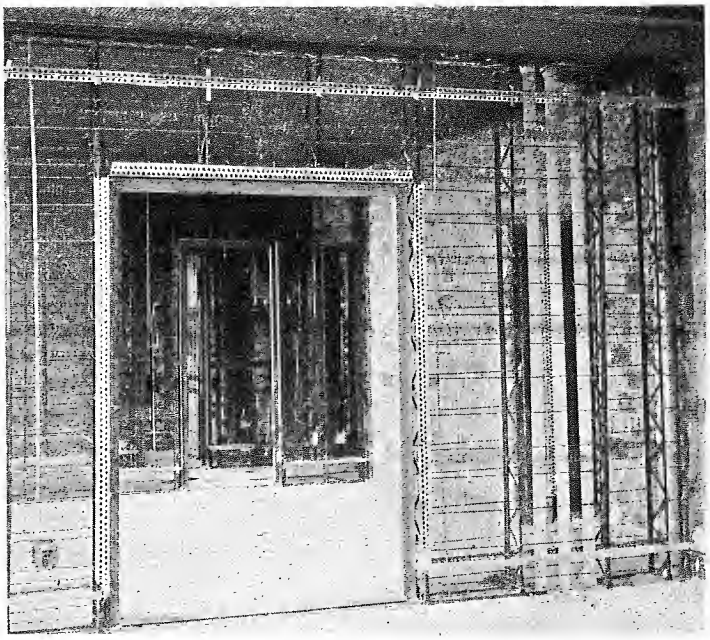
(BOTTOM, RIGHT) Illustrating Application of Concealed Picture Mould and Wide Flanged Metal Corner Beads for Cased Opening; in HOSPITAL BUILDING.











in CHAPTER XV, for Solid Partitions.

However, where *patented stud* Hollow Partitions, and where special clips or lath attachment devices are used, manufacturers' specifications should be consulted.

A typical arrangement of prefabricated studs at a corner and at intersections of two partitions is shown in *Figure 177*.

4. Wood Grounds, Metal Base Screeds, etc., for Metal Lath Hollow Partitions

(See Specification 2, Article H)

For these partitions many of the details or devices described in CHAPTER XVI for grounds on Solid Partitions may be used.

In wide, single-stud Hollow Partitions a single, wide nailing block, *Figure 179*, usually a piece of 2 x 4 is attached to the face of each stud, see upper left, upper right and lower right illustrations in PLATE IV. Short, left-over pieces of odd dimension may be used *(See Figure 180-A)*. Occasionally, where studs are spaced 12 to 16 inches on center, and are quite rigid, nailing blocks are used only on alternate studs.

Strip grounds are nailed to the blocking, *Figure 179*, as required for base board, PLATE IV, or direct to the studs as in *Figure 180-B*.

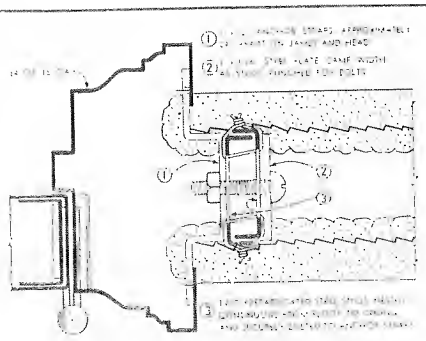


Fig. 172. Combined Metal Frame, Buck and Molded Trim showing attachment of Prefabricated Metal Studs.

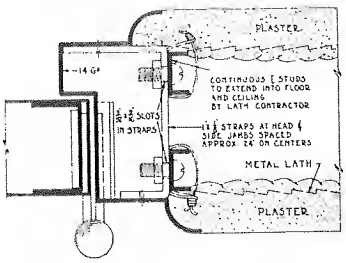


Fig. 174. Flush Combined Metal Frame and Trim with Plaster Mould.

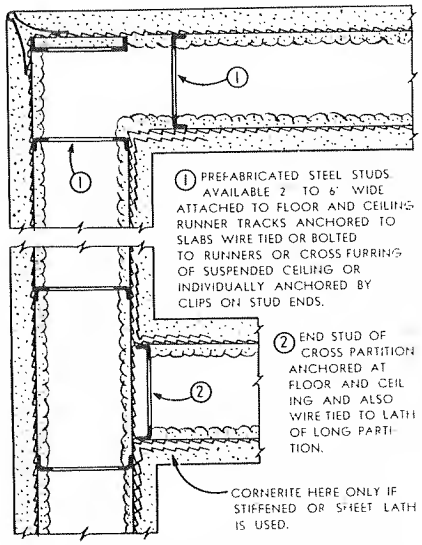


Fig. 177. Diagram Showing Typical Arrangement of Metal Studs at Wall Corners and Partition intersections.

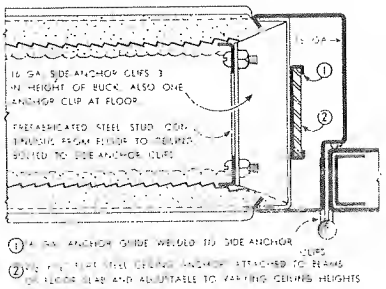


Fig. 173. Combined Metal Frame, Buck and Flush Trim with Prefabricated Metal Stud, and Ceiling Anchors.

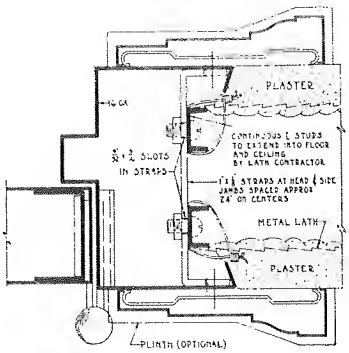


Fig. 175. Combined Buck and Jamb with Clipped-on Metal Casing.

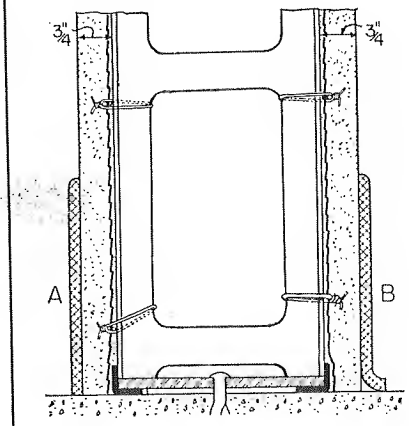
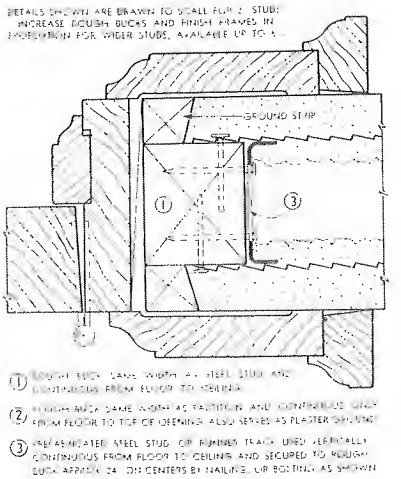


Fig. 178. Rubber or Asphalt Tile Base Details for Metal Lath and Plaster Hollow Partitions.
A—Straight Base. B—Cove Base.



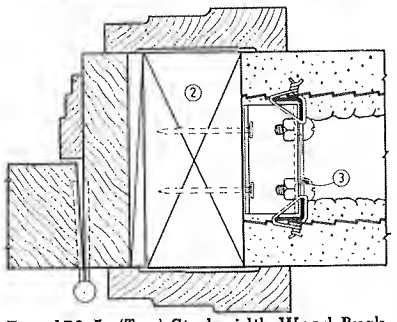


Fig. 176-A. (Top) Stud-width Wood Buck, Continuous to Ceiling; wood trim.
Fig. 176-B. (Above) Partition-width Wood Buck, Continuous only to Top of Opening; wood trim.

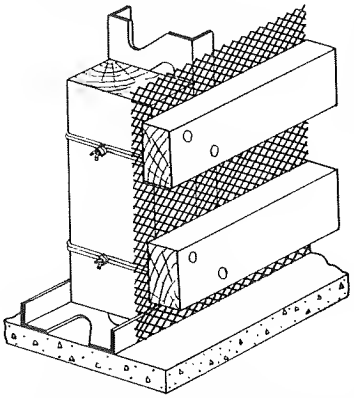


Fig. 179. Typical Arrangement of Wood Blocking and Strip Grounds for Metal Stud Hollow Partitions.

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Where the double row system of ¾-inch channels is used, small nailing blocks as in *Figure 124-B* are applied on each row of channels.

For Hollow Metal Stud Partitions, metal corner beads, screeds and molds are attached over the lath and only to the nearest face of the studs, and aligned as for Solid Partitions.

5. Metal Frames and Trim for Metal Lath Hollow Partitions

(See Specification 2, Article G)

Because prefabricated studs provide practically continuous and positive anchorage up and down the whole openings for metal bucks, special combined metal frame, buck and trim is now available. Such a typical detail with moulded trim is shown in *Figure 172*. In addition, any of the combined or separate buck jamb and trim details used for masonry partition construction may, when modified as to anchorage to the partition, be used with Metal Lath Hollow Partitions.

A detail with flush trim and plaster ground used for housing, hospitals, etc., *Figure 173*, provides direct anchor connections between the frame and a typical one-piece prefabricated stud. It also has an adjustable bar anchor to the ceiling slab, although in many cases such anchors are omitted, especially for openings with wide jambs.

Figure 174 shows another buck, this with a plaster bead. The detail in *Figure 175* is that of a combination frame with clipped-on-ornamental casing. Although these last two details show double-stud construction, they are equally adapted for use with prefabricated studs.

Whether single or double prefabricated studs are to be used adjacent to and as anchorage for bucks, depends on job conditions, and also on the type of stud used. In most instances only a single stud is needed. However, the specifications of the stud manufacturers should be consulted.

A partial list of manufacturers of metal door frames, bucks, etc., is given in the APPENDIX. Others will be found listed in Sweet's Catalogue.

6. Wood Trim for Hollow Partitions

No special mention need be made of wood jamb and casing details for Metal Lath Hollow Partitions as any type used for partitions 3½ inches thick and more may be readily adapted for this purpose. Typical details are shown in *Figures 176-A* and *176-B* and a typical installation in PLATE IV, lower left illustration. Many of those described for Solid Partitions may also be used for Hollow Partitions merely by increasing the size of the jamb and buck.

7. Installation of Electrical Devices, Piping, Ducts, etc., In Hollow Partitions

The continuous hollow space afforded by the various types of prefabricated-stud and double-stud partitions and the availability of the studs for direct attachment of the conduit, (see upper right illustration in PLATE IV and also *Figure 181*) and for the alignment of outlet and switch boxes, etc., entirely eliminates costly cutting of pipe chases, as in masonry, etc. This practically unlimited flexibility of installation is an important construction cost advantage of the *hollow type* of Metal Lath Partition.

Devices used in electrical installations in other types of partitions are also employed in Metal Lath Hollow Partitions.

The same ease of operation confronts the contractor in the installation of plumbing and heating ducts, details of which are described in CHAPTER XVI, and also illustrated in PLATE IV and *Figure 180-A*.

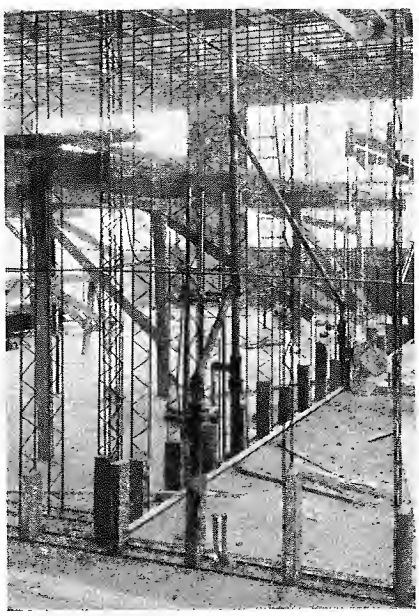


Fig. 180-A. Intersecting Hollow Partitions Showing Blocking for Grounds. Washington Grammar School, Bakersfield, Cal. Symmes and Willard, Archts.

Fig. 180-B. Grounds for Blackboard and and Trim on Metal Stud, and Metal Lath Hollow Partition. Mill Creek School, Erie, Pa. Fred A. Fuller, Archt.

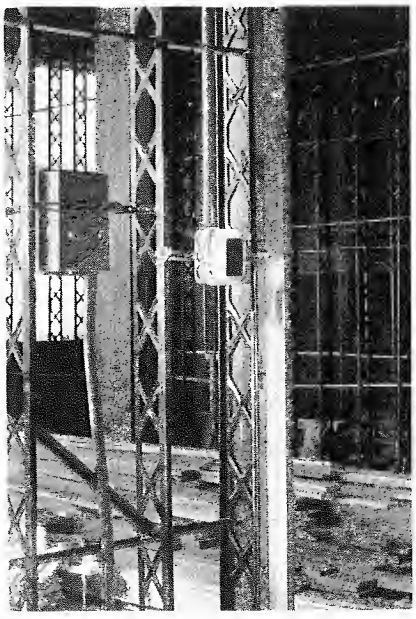


Fig. 181. Conduit, Outlet, and Switch Box In Metal Lath Hollow Partition. Mark Keppel High School, Administration Building, Alhambra, Cal. Marston and Maybury, Archts.

CHAPTER XXII

Metal Lath Double Partitions Details and Assembly Methods

Construction details used in the erection of Metal Lath Double Partitions closely parallel those already described in CHAPTER XXI for Double Row Metal Lath Hollow Partitions. However, there are some important differences which merit attention.

1. Studs for Metal Lath Double Partitions

(See Specification 3, Article B)

For these a double row of standard ¾-inch channel studs 12 inches on center are recommended. Cross braces or separators, connecting the rows on opposite sides, are not used because they help transmit sound, therefore the studs are reinforced where necessary by 1-inch horizontal channel stiffeners placed with the web horizontal in the hollow space and wired permanently to the studs. *(Figure 182.)* These stiffeners may be omitted for partitions under 8 feet in height provided wide flanged ¾-inch channels or standard 1-inch channels are used for studs. However stiffeners are recommended for best results where rigidity is essential and for partitions more than 8 feet high and for those over 10 feet long.

Independent sets of horizontal channels are used for each row of studs and should be spaced not to exceed 4 feet on center vertically, at least two being provided for partitions 9½ feet high, or over. They should be placed so that no parts come in contact with any part of the partition on the opposite side and so they touch no conduits, service piping, ducts or similar construction which would function as a source or carrier of sound.

The distance between faces of these sound-insulating partitions depends on the degree of insulation desired. However as pointed out in CHAPTER VI, *Page 41*, marked increases in depth do not add materially to the sound insulation value, and, all things con-

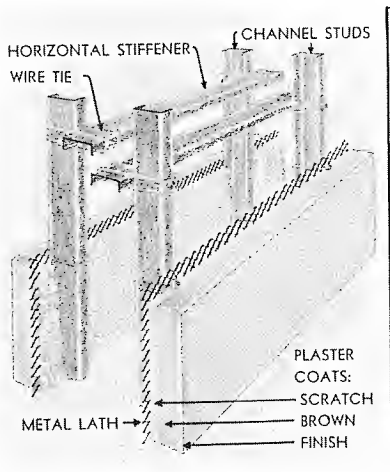


Fig. 182. Arrangement of Double Channels and Stiffeners for Sound Insulating Partitions.

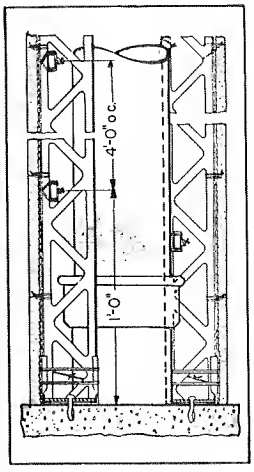


Fig. 183. Double and Staggered Prefabricated Studs.

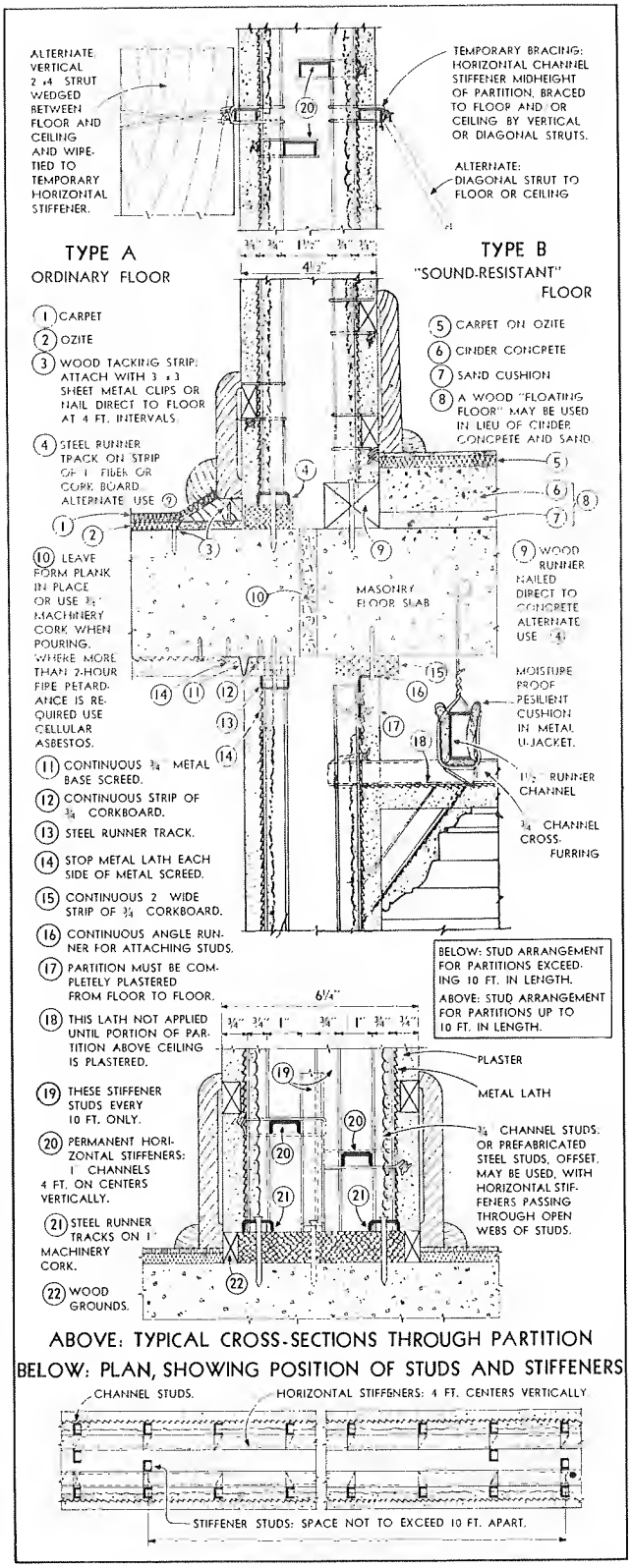


Fig. 184. Insulation Details of Metal Lath Double Partitions In Ordinary and Sound-Insulated Floor and Ceiling Construction, Showing Insulation of Runner Tracks.

sidered, optimum results are obtained with an over-all thickness of 5½ inches. Furthermore, the thickness should be adapted to properly house, with ample clearance, the conduits or piping, if any are to be enclosed therein. If nothing is to be placed in the hollow space the out-to-out distance can be made as small as 4½ inches, and this will also accommodate horizontal runs of conduit without increasing the depth of the partition. Where vertical runs of conduit or service piping, etc., are to be accommodated their outside diameter should be added to the 4½-inch minimum above to determine face-to-face of plaster depth of partition.

Additional Reinforcing for Long Partitions

For partitions of this type more than 8 ft. high when exceeding 10 ft. in length *(such as for corridors, school rooms, etc., and especially where impact stresses may be expected)* ¾-inch channels should be placed vertically in the hollow space, from floor to ceiling every 10 feet along the partition to reinforce the horizontal stiffening channels previously referred to. *(See plan in Figure 184.)*

These intermediate vertical stiffeners should be staggered for the two sides of the partition so they make no contact with any of the construction on the opposite side.

They should be securely tied to both the horizontal channel and the stud opposite which they are located. The depth of those vertical stiffening channels, when used, should be added to the 4½-inch minimum depth mentioned previously to determine the plaster-to-plaster outside thickness of partitions.

Use Larger and Stiffer Channels For Greater Heights

For the greater heights, instead of stiffening the ¾-inch channels by the means indicated, the same results may be accomplished by using studs stiffer in themselves, in effect free-standing furring. For this purpose 1-inch cold-rolled channels with ⅜-inch flanges may be used at not to exceed 12-inch centers for heights of 8½ feet; with wide flanges, 10 feet. For heights of 12 to 14 feet, 1½-inch cold-rolled channel studs should be used. No horizontal stiffeners will be necessary. *See diagram on Page 101,* CHAPTER XXIII.

2. Prefabricated Steel Stud, Double and Staggered Stud Partitions

Another method of construction employs prefabricated steel studs of 2-inch dimension or more, using these in pairs independently, *See Figure 183*, for each face, or by staggering them on the two faces of the partition. Lath is, of course, applied only on the outer faces of the studs.

Since such studs have great rigidity they may be used for partitions up to 16 feet in height. However, continuous horizontal stiffening channels should be provided and be permanently secured along the unlathed sides of the studs.

The all-over thickness of the partition may be reduced by staggering the studs, although in doing so care should be taken that no parts of the tracks for each face, at top or bottom, or horizontal reinforcing channels, are in contact.

3. Staggered and Double Wood Stud Partitions

Stud and general assembly details for a staggered wood stud and Metal Lath Partition having a high sound insulating rating are shown in *Figure 185*. Note particularly the slip-joint above the row of flatwise studs which assures that no ordinary amount of sagging or deflection of the joists above will put a load on them and cause plaster cracks or affect the sound insulating properties of the partition.

4. Insulation Under Floor Runners Recommended

(See Specification 3, Article C)

In channel stud Double Partitions, floor and ceiling runners used under and over each row of studs may be attached to masonry floors and ceilings in the manner described for Solid Partitions in CHAPTER XIII. Studs should not stop at a suspended ceiling but should be carried direct to the slab above.

However, insulating the partition from floors, ceilings and walls improves the insulation properties of the partition materially. Therefore, for additional sound resistance, the floor runners are placed on a continuous strip of wood or of machinery cork or lead laid on the floor, the track and cork or lead insulation strip, when used, being attached simultaneously to the masonry with hardened masonry nails, Rawl drives or similar devices. As an alternate method, the stud ends may be set into felt or cork or live-rubber lined holes provided in the floor slabs.

5. Lathing Metal Stud Double Partitions

(See Specification 3, Article D)

These details are the same as for Metal Stud Hollow Partitions *(CHAPTER XXI, Article 3)* with double studs, excepting that in the Double Partitions it is important that the wire ties for the attachment of the Metal Lath be confined to use around the channels. They should not continue around piping, conduits, etc., which are carriers of sound. It is recommended that this point be inspected from time to time on every job of this kind.

6. Wood Grounds and Metal Screeds

Details are the same as for Hollow Partitions *(CHAPTER XXI, Article 4)*. However, it is important, *(Figure 184)*, to lessen sound transmission, that no wire ties or nails for the attachment of grounds be permitted to run through to touch any part of the opposite half of the partition.

7. Wood and Metal Trim

Although doors are seldom placed in double partitions used for sound insulation, it is entirely feasible to make such openings, when used, more highly resistive to the passage of sound, by employing doors made highly sound insulative of themselves, and insulating pads and separate jamb, frame and trim construction.

8. Installation of Electrical Devices, Piping, etc., in Double and Staggered Stud Partitions

Specifications with respect to the installation of the work of the mechanical trades should include cautions that conduit, ducts, piping, etc., be kept clear of studs, etc. For special purposes, wrapping of waste pipes with mineral wool bats *(Figure 156-C)* should receive consideration.

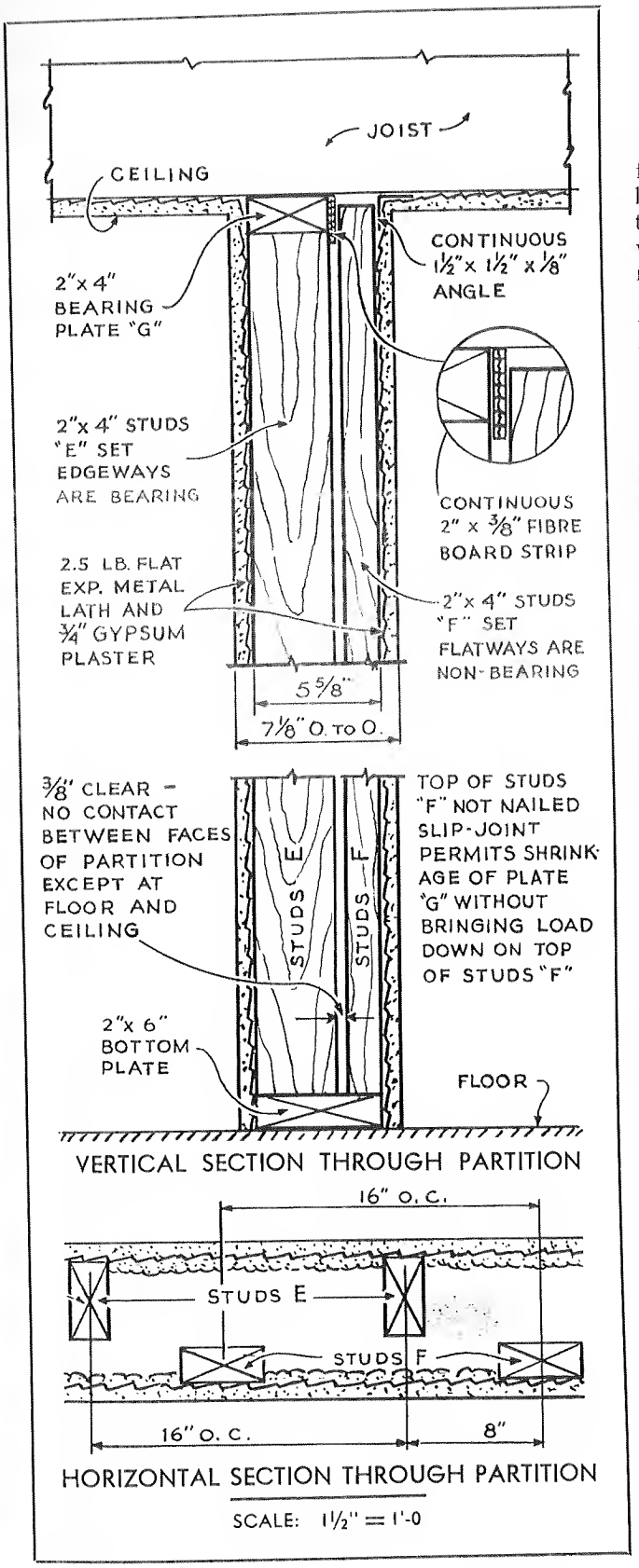


Fig. 185. Details of Fire-Protected, Sound-Insulating, Staggered Wood Stud Bearing Partitions.

CHAPTER XXIII

Wall, Pipe, Duct and Column Furring

1. Purposes of Furring

Vertical furring is used: *(a)* to provide concealment for service piping, ducts, etc.; *(b)* to conceal irregularities in masonry walls or other supporting construction; *(c)* to provide a means for attaching plaster base where the plaster will not adhere to or cannot be economically attached to the surface otherwise available; *(d)* to provide a space between exterior walls and interior plaster finish to permit introduction of heat insulation materials or to prevent condensation and discoloring of the plaster; *(e)* to provide an additional surface, or series of surfaces, separated from an existing exterior or interior wall, partition or other vertical element of construction to reduce the amount of sound which may pass through; *(f)* to provide a base for a plastered interior finish of different line and contour *(which may be highly decorative)*, than that represented by rough or finished masonry; *(g)* to furnish, in combination with Metal Lath and gypsum or Portland cement plaster, a measurable degree of fire protection to structural supporting members, ventilating ducts, etc.

Circular C-151, "Wall Plaster: Its Ingredients, Preparation and Properties" issued by the National Bureau of Standards, after citing some of the foregoing advantages of furring, states:

"Therefore, it is recommended that all exterior masonry walls be furred. The improved durability of the plaster and decorations, and the comfort of occupancy, amply justify such a recommendation."

2. Metal Furring and Lathing

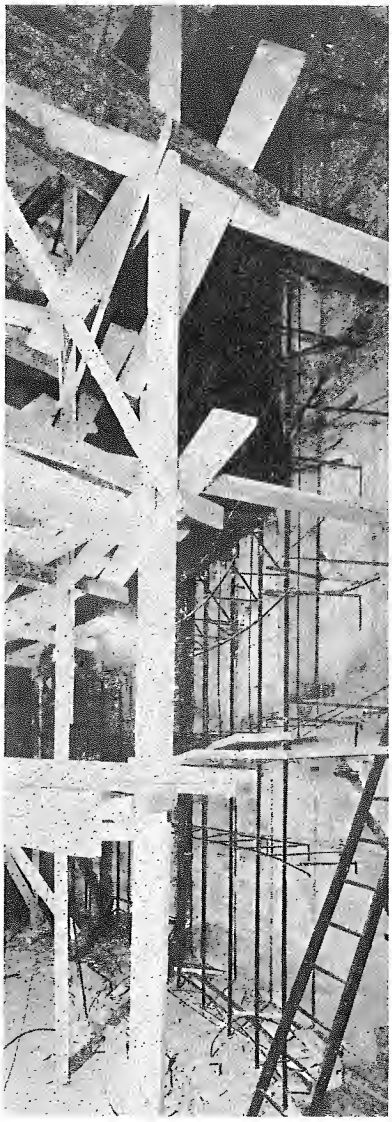
As compared with tile used for the furring of masonry walls, Metal Furring and Lathing offer the essential advantages of lower first cost, and greater flexibility. Besides these, it also facilitates, in greater degree, the use of insulating fills and blankets; research has shown these aid materially in reducing heat losses. Since concealment of piping and ducts on exterior walls is so essential in many types of occupancy, this can be most economically worked in with the furring of the wall proper, and Metal Lath and Furring used for both.

3. Two Types of Vertical Furring

Vertical furring is of two general types: Braced and free-standing.

4. Braced Furring

The braced type of furring is the one most commonly used. The vertical members or studs are braced or otherwise supported at intervals from the wall or partition which they parallel, usually only because the height of the verticals are such that, in the course of plastering, they would, if not braced, deflect more than is desirable. Furthermore, when completed they provide, because of the bracing, a stiffer wall than the unbraced type. In addition, the bracing permits the use of lighter and smaller vertical members or studs; and this, particularly on high walls, means greater economy.



Various methods are provided to furnish this lateral stiffening, the most common being continuous horizontal cold-rolled channels spaced about 4 feet on centers vertically, secured to the partition or wall. *(Figure 187.)* Usually the horizontals are placed close to the surface to be furred, and therefore masonry nails or expansion drive bolts spaced about 3 feet on centers are used for the anchorage. However, a nail is usually dropped between the horizontal channels and wall to permit tying the verticals to them, and also to prevent condensation from entering the plaster. A very large majority of all furring jobs of exterior walls are done by this simple and inexpensive method.

Where furring is to be held 3 inches or more from the wall, short pieces of ¾-inch channels or ¼-inch or ⅜-inch flats driven into the masonry joints and bent at an angle are commonly used for anchoring and spacing purposes. *(Figures 186, 186-A, 191.)* For short offsets a bent channel or bar secured to the masonry walls, as in *Figures 195 and 196*, is frequently used.

The vertical spacing of the horizontal stiffening members depends on the stiffness of the vertical channels or other type of studs used. Suggested spacings are shown in *Figure 190*.

The spacing, center to center, of vertical furring members depends on the type and stiffness of Metal Lath used and is the same as for Metal Lath Hollow Partitions. *(See* CHAPTER XXI, *Table IV-A, Page 93.)*

Vertical furring members should be securely tied to horizontal members with No. 14 W. & M. gage galvanized wire, or saddle-tied with three loops of No. 18 W. & M. gage galvanized soft annealed wire, or equivalent devices, and securely anchored to the floor and ceiling construction. Where the height exceeds 16 feet, special truss bracing, as in *Figure 186-A*, should be provided.

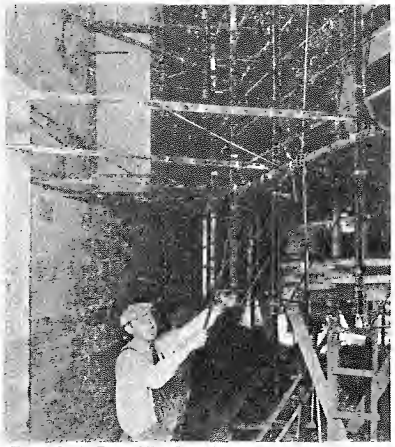


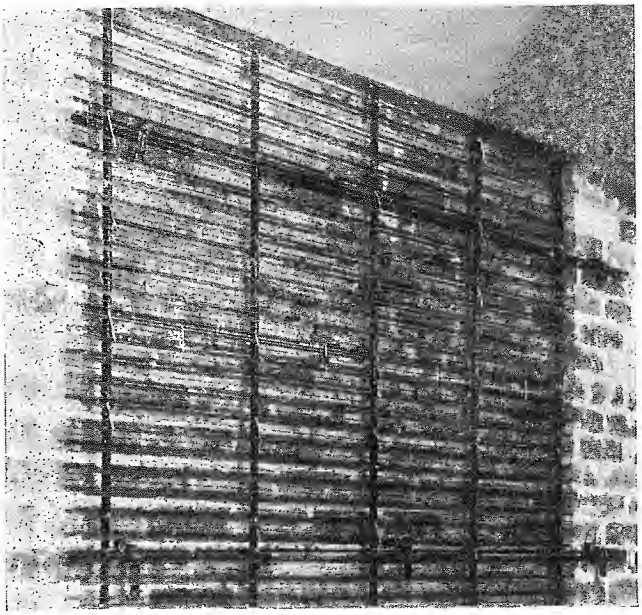
Fig. 186-A. (ABOVE) Showing Bracing in Rhodes Theatre of Furring to Exterior Masonry, in Some Places 6 Feet Away. This Portion Used for Framing and Support of Indirect Flare Lighting.

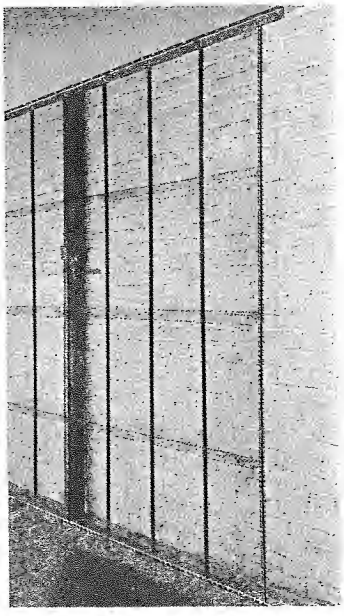
Fig. 186. (EXTREME LEFT) Metal Lath and 1½-Inch Channel Iron Braced Furring for Curved Proscenium Wall 30 Feet High for Rhodes Theatre (1938) Chicago. C. W. and George L. Rapp, Inc., Architects.

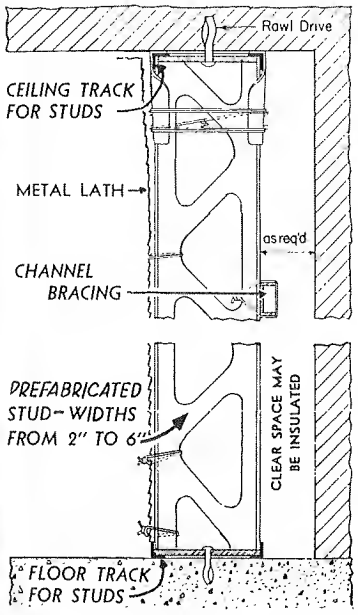
Fig. 187. (LOWER LEFT) Masonry Wall with Horizontally Braced Channel Stud Metal Furring and Metal Lath.

Fig. 188. (CENTER BELOW) Free-Standing Channel Stud Metal Furring with Ceiling Track and Integral Metal Base.

Fig. 189. (LOWER RIGHT) Free-Standing Prefabricated Metal Stud Wall Furring Anchored to Floor and Ceiling Slabs.







DETAILS FOR VERTICAL FURRING

Band-Iron Furring

Crimped painted band iron made of strips of No. 22 U. S. gage metal in widths of ¾ or 1-inch has been used successfully for wall furring, particularly in school buildings. Brick staples, placed not more than 24 inches on centers, are used to attach it in a vertical position (with the *thickness* of the band against the lath) to masonry walls. Spacing of the band-iron furring should not exceed 16 inches on center. Metal Lath is stapled over the furring with brick staples; these should be long enough to provide a penetration of not less than ¾-inch into the masonry joints.

Wood Furring

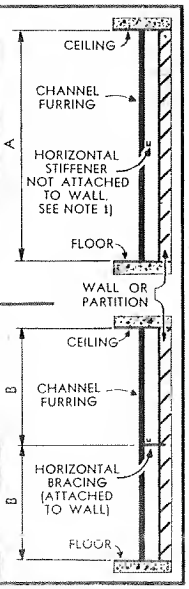
In stores and dwellings built with masonry walls, the use of 1 x 2-inch wood furring is quite common. *(See Figure 202.)* This stripping is applied vertically on 12-inch to 16-inch centers. It is secured to the masonry by driving cut *(wrought-iron)* nails into dry joints or ordinary wire nails driven into wood "*bricks*" set into the walls at 3 to 4-foot vertical intervals for that purpose. The Metal Lath is nailed direct to the stripping; or, where greater thermal insulation is desired, insulation is applied first in "blanket" form after which the lath is applied over the "blanket" and nailed to the same strips. A vapor-seal covering for the side of the insulation nearest the lath is recommended to prevent moisture from being withdrawn from the plaster and carried into the insulation. Crimped or self-furring Metal Lath is also recommended for best results, when lath is applied over such backing.

1. Free-Standing Furring

RECOMMENDED MAXIMUM UNSUPPORTED HEIGHT, "A" [1]

Channel Size	⅜" Flange	Wide Flange
¾"	6'-0"	8'-0"
1"	8'-6"	10'-6"
1½"	12'-0"	14'-0"

[1] Horizontal Stiffeners, spaced same as Bracing in Table 2, are recommended for all Free-Standing Furring. For furring more than 16" o. c., use one-half these spacings, with minimum of 3'-6".



When overall height of furring exceeds Height A in table above, install Horizontal Bracing as given in table below:

2. Braced Furring

RECOMMENDED MAXIMUM DISTANCE, "B," BETWEEN HORIZONTAL BRACING

Channel Size	⅜" Flange	Wide Flange
¾"	4'-6"	6'-6"
1"	6'-0"	8'-0"
1½"	8'-0"	10'-0"

Special Furring Devices

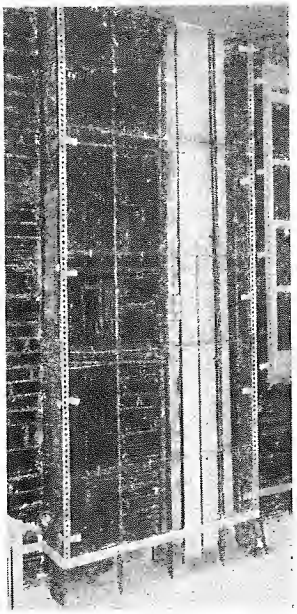
Besides the foregoing commonly used devices for anchoring and spacing the furring away from the wall, a number of patented and other systems, several of which are illustrated and described in *Figures 197 to 201, inclusive*, are also available.

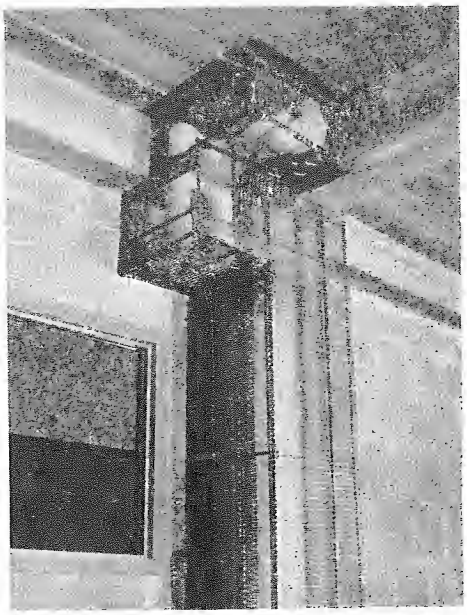
Fig. 190. (UPPER RIGHT) Permissible Heights for Channel Studs for Various Heights of Free-Standing and Braced Furring.

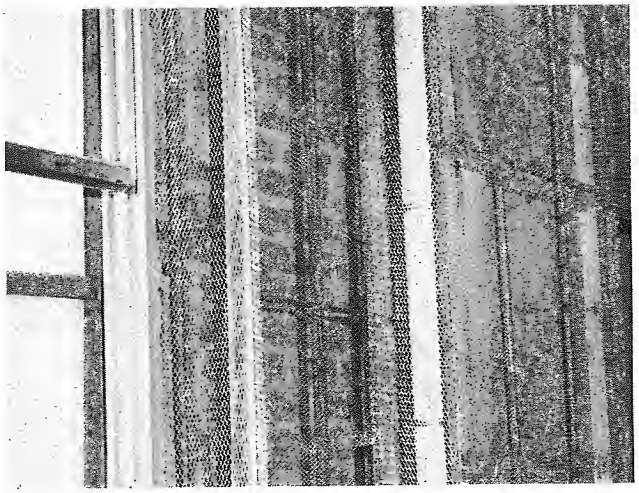
Figs. 191 and 192. (CENTER and RIGHT) Metal Lath and Channel Furring for Enclosures of Vertical Piping, Administration Building, Veterans' Administration Home, (Leavenworth) Kansas, 1932. (Note cornerbead protection, Figure 191.)

Fig. 193. (BELOW) Metal Furring of Exterior Walls, Concrete Columns and Vertical Heat Ducts. Fireproof Reinforced Concrete House, Cincinnati, Ohio, 1936.

Fig. 194. (LOWER RIGHT) Furring and Lathing of Window Jambs and Walls and Offset to Cover Piping. Doctors Hospital, Washington, D. C., 1939. Francisco and Jacobus, Architects and Engineers.







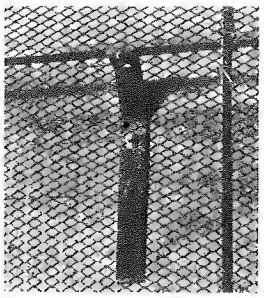


Fig. 195. Bent Strap Iron Brace and Anchor for Horizontal Furring Stiffener.

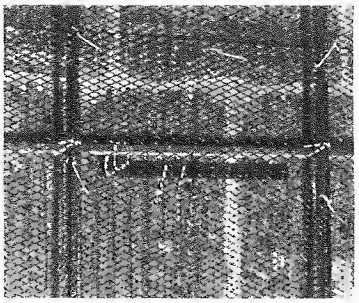


Fig. 196. Bent Channel Iron Brace and Anchor for Horizontal Furring Stiffener.

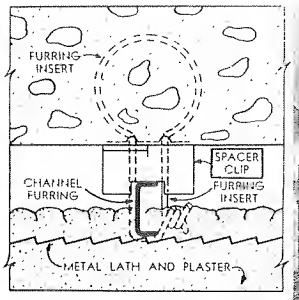


Fig. 197. Furring Insert and Spacer (Patented) for Concrete and Unit Masonry Walls.

Fig. 200. (RIGHT) Adjustable Anchor and Wall-Furring (Patented) System for Masonry Walls Designed to Prevent Condensation from Dampening Furred Plaster, V-shaped Horizontal Furring with Special Clips, etc. Used on Rockefeller Center Buildings, etc.

Detail (RIGHT, BELOW) Shows Modified System with Horizontal Furring Channels.

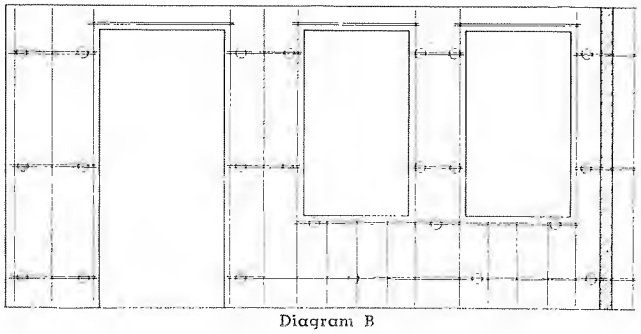
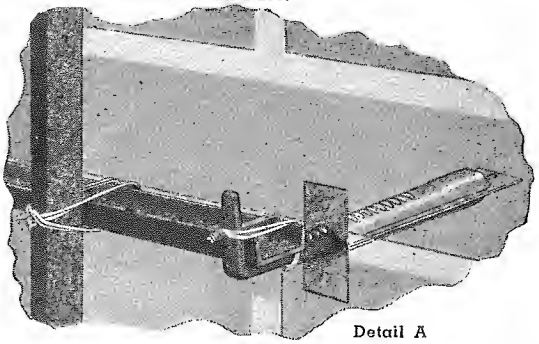
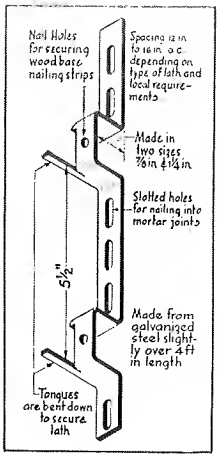


Diagram B

Fig. 199. (BELOW) Adjustable Wall Furring Anchor. (Patented) Showing at (A) Socket Inserted in Masonry Wall (Also Available for Concrete) with Malleable Iron, Threaded Channel Bracket Providing Adjustment at 3/16-Inch Intervals for Spacing of Furring. Circles in Diagram (B-ABOVE) Show Recommended Distribution on Wall Face.



Detail A



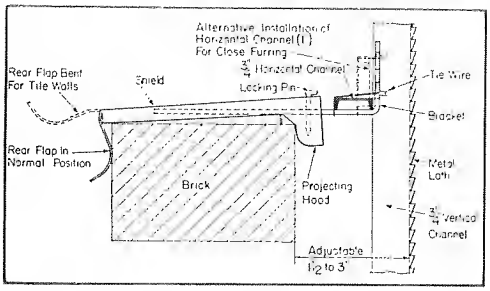
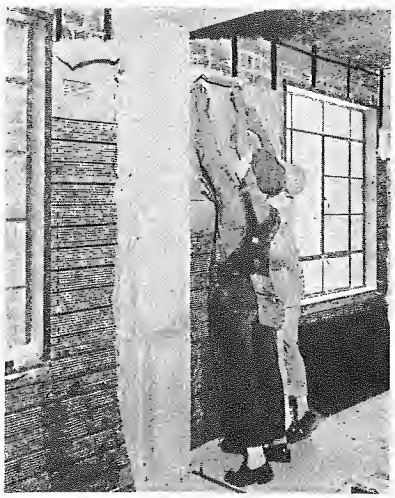


Fig. 198. (LEFT) Pronged Metal Furring System (Patented) For Masonry Walls. After Lathing, Prongs are Bent Over to Secure Lath.

Fig. 201. (EXTREME LOWER LEFT) Vapor-Proofed Mineral Wool Blanket Being Applied Over Patented Pronged Furring Members, Attached to Masonry Walls. Metal Lath is Applied Over Remaining Prongs which are Bent Over to Secure Lath. (LEFT) Enlarged Detail Showing Various Steps in Application. (Photos of Parkchester Houses, constructed by Metropolitan Life Insurance Co., New York City.)



For Names of Manufacturers of the Furring Devices, corresponding to figure numbers above and other devices, see APPENDIX.

Adjustable Anchors

Attention is called to the devices with adjustable anchors. They have been used successfully on important structures in recent years, and have a wide range of application to meet construction and occupancy requirements. (For manufacturers' names see inside back cover.)

5. Free-Standing Furring

Free-standing furring is merely braced furring without the bracing, or in other words, one-half of an average double row Hollow Stud Partitions. For low-ceiling heights, ordinary channels are used, *Figure 188*, or for greater heights thicker and stiffer channels or prefabricated studs as in *Figure 189*.

Figure 190 shows suggested limitations on height for various sizes of cold-rolled channel studs. For other conditions the braced type of furring should be used.

Free-standing furring should be well secured at both floor and ceiling. Sometimes, for the purpose of securing better alignment, continuous horizontal rods or channels *(which, of course, should not be secured to the wall being furred)*, are tied to the back of the studs, spacing varies with floor-to-ceiling distance. A typical installation is shown in *Figure 189*.

6. Pipe Furring

Pipe furring is usually braced or a combination of braced and free-standing furring. In *Figure 191* the 4-foot face of the furring is spaced from the masonry wall by horizontal channels driven into the mortar joints. An intricate bit of pipe furring used for concealment purposes is illustrated in *Figure 192*.

Furring for the concealment of piping and ducts should be clearly marked and typical large scale details shown in the Architectural Plans. Without such details the contractor is seriously handicapped in figuring what is desired and many unfortunate situations can be avoided if the Architect will be reasonably specific in describing which furring is desired and where it shall be placed.

7. Column Furring for Fire Protection

Steel Members

Both braced and free-standing furring are frequently used for the attachment of Metal Lath used as the base for plaster serving as column fireproofing, *Figure 203-A*. Tests by the Bureau of Standards and the Underwriters' Laboratories have shown that steel columns protected with one layer of ¾-inch gypsum plaster on such lath and furring and separated ¾-inch from the steel will provide a ¾-hour fire rating. When two separate layers of such furred fire protection are provided, ratings up to 1½ and 2 hours are obtainable depending on the type of plaster used. Greater ratings are assured by using unsanded or lightly sanded wood-fibred gypsum or Vermiculite plaster.

When the space between the steel column and the Metal Lath and Furring is filled with 3 inches of concrete, the column is entitled to a 3-hour fire rating, *Figure 203-B*.

Concrete Columns

The use of 1-inch of gypsum plaster on light expanded metal, furred out one-half inch from a reinforced concrete column resulted in strengths, after 4-hour standard fire tests at the National Bureau of Standards, of more than three times that of columns which had no plaster.

In *Figure 19.3* is illustrated a method of applying Metal Lath and plaster protection for reinforced concrete columns.

8. Fire-Proofing of Ventilating and Other Ducts

The greatly increased use of air-conditioning apparatus has resulted in the extensive use of sheet metal duct work. Building code regulations require that such metal ducts be properly fire-protected on each floor through which they pass. Heretofore, bulky masonry block, frequently 6 inches in thickness, has been used for this purpose. Much valuable floor space is needlessly consumed thereby.

Metal Lath and plaster applied to vertical furring provide the necessary fire protection and occupy minimum floor space. By suitable choice of plaster, construction which is entitled to 1, 2 and 3-hour fire ratings is obtainable. Details are illustrated in *Figure 204*.

For ordinary duct work in residential occupancies Metal Lath and plaster secured to wood furring *(Figure 205)*, affords ample security against fire and is especially advantageous because of its resistance to plaster cracks such as are induced by sudden temperature changes.

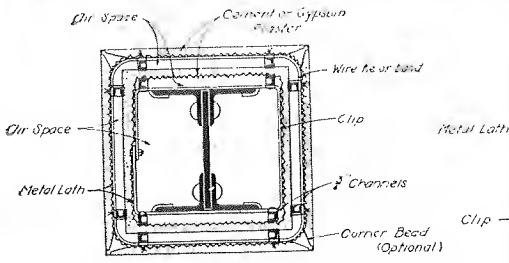


Fig. 203-A. Double Layer Plaster Fireprooling of Typical Steel Column; for Single Layer Omit Outer Furring, Lathing, and Plaster. The Fireproofing of "H" Columns Is Similar.

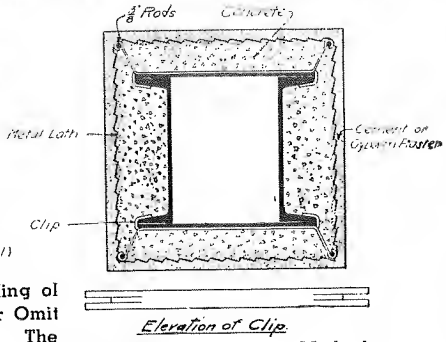


Fig. 203-B. Another Method of Fireprooling Columns Using Concrete.

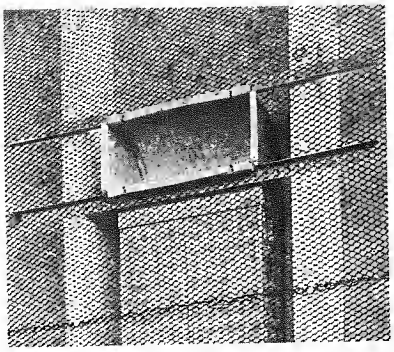


Fig. 205. Method of Supporting Air Ducts in Metal Lath Wall. Details are also adapted for Metal Studs.

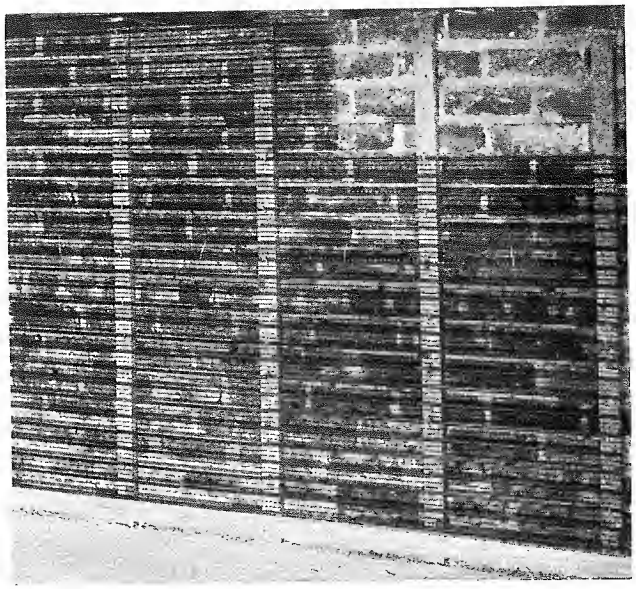


Fig. 202. Wood Furred Masonry Wall Lathed with Metal Lath.

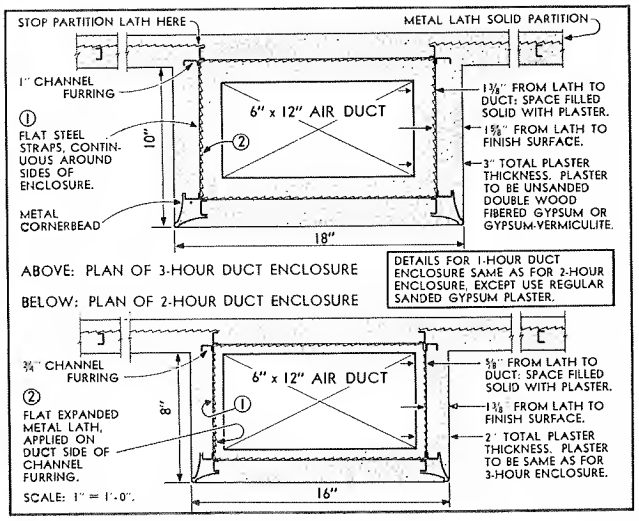


Fig. 204. Typical Details for Fire Protection of Sheet Metal Ventilating and Heating Ducts.

CHAPTER XXIV

Additional copies of these specifications are obtainable in separate form convenient for the use of architects, engineers and builders on application to the Metal Lath Manufacturers Association, 208 South La Salle Street, Chicago. *They are bound under the title* "STANDARD METAL LATH SPECIFICATIONS FOR BETTER PLASTERING AND CONCRETE STUCCO," *and include complete specifications for all types of Metal Lath for interior plastering and exterior stucco.*

Specify Solid Metal Lath Partitions Outright or Include a Metal Lath Solid Partition Alternate in Your Request for Bids. Options Permitting the Contractor to Furnish Other Types of Partition in Lieu of Metal Lath May Result in the Use of Constructions Which, Although Perhaps Costing No More, Do Not Have Behind Them the Long Record of Metal Lath Solid Partition Experience.

In order to obtain the full saving in cost through use of 2-Inch Solid Metal Lath Partitions, Architects are urged to include an outright specification for them, or an *alternate* in every specification in which masonry or other partitions are otherwise specified; and to request bidders on metal bucks and trim, millwork and carpentry to show the savings due to smaller door bucks, less costly erection of grounds and less expensive trim which are made possible by the use of the Solid Metal Lath Partitions.

The importance of proper construction of metal or wood bucks and trim and wood grounds to assure greatest durability and a straight and true partition has been emphasized herein. Consequently, the specifications which follow cover some of the requirements for bucks, grounds, electrical devices, etc. These properly belong in the carpentry or electrical specifications, etc. For ready reference the sections containing them are so marked.

It is recommended that the architect permit the lathing contractor entire freedom in selecting weight and class of lath in accordance with Article A below. This will assure maximum economy on account of experience which varies materially in different parts of the country.

Specifications for Deep-Rib Lath and Reinforcing will be furnished upon request.

No. 1. Specifications for Solid Metal Lath Partitions

(A) Weights of Metal Lath

All lath shall be specified by weight per square yard in accordance with the spacing of supports as given in the table below. Weights given are exclusive of paper, fibre, or other backing.

TYPE OF LATH	Weight, Lbs. per Sq. Yd.	Spacing of Supports, Inches
Flat Expanded Lath	2.2	12
	2.5	16
	3.0	16
	3.4	16
Flat Rib Lath	2.75	16
	3.0	19
	3.4	24
	4.0	24
⅜-Inch Rib Lath, or Lath of Equal Rigidity	3.0	24 a
	3.4	31½ b
	4.0	31½ b
Sheet Lath	4.5	24

a These spacings permissible for Solid Partitions not exceeding 16 ft. in height. For greater heights, permanent horizontal stiffener channels or rods must be provided on channel side of partitions, every 5 feet vertically, or else these spacings shall be reduced 25%.

b These spacings permissible for Solid Partitions not exceeding 12 ft. in height. For greater heights, permanent horizontal stiffener channels or rods must be provided on channel side of partition every 6 feet vertically, or else these spacings shall be reduced 25%.

(B) Size and Spacings of Studs

(a) For 2 or 2¼-Inch Solid Metal Lath and gypsum plaster partitions up to 12 and 14 feet in height, respectively, channel studs shall be ¾-inch, weighing not less than .276 lbs. per ft. or ¾-inch, .332 lb. channels for 2-inch, 14 ft. high partitions. Over 14 feet and up to 20 feet in height, 1-inch studs weighing not less than .332 lbs. per foot shall be used. Minimum partition thickness, using 1-inch channels, shall be 2¼ inches. Over 16 feet in height such partitions shall have minimum thickness of 2½ inches and be 2¾ inches thick for heights over 20 feet. Thickness for heights of 24 and 30 feet shall be 3 and 3½ inches, respectively, and studs shall be 1½-inch channels weighing not less than .442 lbs. per ft., or equivalent. Length between columns, walls or other vertical structural members shall not be greater than two times the partition height when the latter is 12 feet or more, nor greater than one and one-half times the height when latter exceeds 16 feet; nor greater than height when it is 30 feet or more. For lengths exceeding these, thickness shall be increased 20%.

(C) Assembly of Channel Studs

(a) Studs shall be set in track channels, or stud clips, or other means of alignment and attachment at both floor and ceiling shall be used, such as by inserting stud ends in holes cut in top of concrete or other masonry floors or punched in soffits of masonry ceiling, or by wire tying to 8d nails, driven into tops of wood floor runners or into ceiling joists, or where Metal Lath ceilings are used upper ends of channels may be inserted into holes made in ceiling lath, and channel studs wired to a pencil rod or channel secured to ceiling lath.

NOTE: Consult manufacturers' catalogs for specifications covering patented solid partition construction systems.

(b) For removable partitions, lower end of channels shall be secured to track channels or special stud shoes attached to wood runners, or be set in holes bored into, or wire-tied to 8d nails driven into 2x2-inch wood floor runners nailed to wood floor or ceiling joists, such runners to be secured to masonry floor by masonry nails or Rawl drives.

(c) Where two-piece studs are used they shall be spliced within 2 feet of ceiling by lapping not less than 8 inches with the flanges interlocked and securely wired in two places not less than 6 nor more than 12 inches apart. Where single-piece studs are used, channel shall be of length to permit anchorage at top and bottom without material bowing when fully erected.

(d) Two channel studs, or their equivalent, continuous from floor to ceiling, shall in every case be placed adjacent to and at each side of vertical door bucks *(four studs required per opening)* and shall be so placed that space is provided between them and bucks for tying ends of Metal Lath sheets to such studs. Where metal or metal and wood bucks are used, and excepting where such bucks dispense with need of channel directly against bucks, such double channels shall be wire-tied to said bucks in a secure manner. Where wood bucks are used, two 8d nails shall be driven in pairs at intervals of 2 feet, beginning 9 inches above floor, into the wood buck, and the double channels at each side securely wire-tied to said nails.

(e) A horizontal reinforcement consisting of a ⅛ x 1¼-inch flat bar or a ⅜-inch diameter rod or a perforated flat strip shall be run across the top of each door opening on the channel side of the partition and extend continuously past the double studs and just beyond the first single studs at each side. This reinforcement shall be saddle-tied to each full stud it crosses and to jack studs over openings. Such strip shall be located about 6 to 8 inches above the top of the door.

(f) Solid partitions shall be temporarily braced on the channel side at intervals not exceeding 5 feet vertically, before application of plaster. Use 2x4-inch or other stiff bracing when unsanded gypsum plaster is used.

(D) Erection of Metal Lath

(a) Metal Lath shall be applied to only one side of the channel studs with the long dimension of the sheet across the studs; Rib Metal Lath with the ribs against the studs.

(b) Sheets shall be secured to the channel studs by wire ties at intervals not exceeding 6 inches, and a tie shall be placed where sides of sheets lap at supports.

(Because these partitions are backplastered, the side ties at edge laps of sheets may be omitted, particularly when studs are closely spaced.)

Equivalent clips or other attachment devices may be used instead of wire ties.

(c) Expanded Metal Lath shall be lapped at sides not less than ½ inch, and at ends not less than 1-inch. End laps of sheets should generally occur only over supports; if between, ends of sheets shall be securely laced together with No. 18 gage galvanized annealed wire.

(d) Rib Lath and Sheet Lath shall be lapped at sides by nesting outside ribs or selvage. Rib Lath shall lap 1-inch at ends and Sheet Lath by lapping one series of loops and nesting tops and bottom of lapping sheets.

(e) All lath shall be started one stud away from corner and be bent into the corner and carried on to the abutting wall to avoid a joint at juncture of walls, provided that where Rib or Sheet Lath is used it shall be butted into all corners, and corner strips of lath bent into the shape of an "L," (Cornerite), with each leg not less than 3 inches wide, shall be applied over the butting lath in such angles and shall be securely wired along each edge in all corners; Cornerite shall not be fastened at its corner, but only along each edge. Cornerite is not required for Flat Expanded Lath.

(f) Lath shall be placed so that the lower sheet laps over the upper *(not vice versa)*.

(E) Tie Wire

Tie wire for attaching Metal Lath to channel studs, furring, etc., shall not be less than No. 18 gage galvanized soft annealed wire, spaced not to exceed 6 inches on centers.

(F) Metal Base Screed, Picture Mold, Integral Metal Trim

(a) Metal base screed or picture mold shall be wired to channels through holes provided in screed for that purpose and, where necessary, shimmed-out to line. Metal trim of the integral type shall be aligned, leveled and well secured to tops of floor slabs. Attachments shall be masonry nails penetrating at least ½-inch into slab and spaced at 12-inch centers; or every third nail shall be omitted and Rawl drives or equal anchors shall be used (consult specifications of metal base manufacturers).

(G) Bucks (Carpenter Contractor)

(a) Metal door bucks shall be erected in accordance with specifications of manufacturers thereof and be well secured to floor and ceiling construction by Rawl drives, expansion bolts, lag screws or other equally strong and permanent devices.

(b) Wood door bucks shall be full dimension at least ¾-inch greater than partition thickness and made from straight grained lumber substantially free from knots. Bucks shall be of out-to-out dimension which will permit casing to cover joint between buck and plaster at least 1-inch.

(c) Bottom of wood door bucks shall in every case be securely nailed to wood floors with at least 2 ten-penny nails each side and be secured to masonry floors by attaching metal plate or socket to bottom and securing to floor by Rawl drives, stub or hardened masonry nails; or by toe-nailing to permanent plugs set in floor.

(d) Bucks shall be carefully plumbed and, unless separately anchored to underside of floor above, shall be kept braced until plaster has set.

(H) Wood Grounds (Carpenter Contractor)

(a) Wood grounds shall be set by carpenter true to line and shall consist of wood strips of proper thickness and 2-inch nominal width placed on each side of the partition and wired or nailed to each other, (or wired to studs or nailed to blocks which shall be securely wired or clamped to channels).

(I) Electric Conduit, Switch Boxes, Etc. (Electrical Contractor)

(a) Contractor shall provide standard shallow electrical convenience outlets, devices, etc., not exceeding 1½ inches in depth for 2-Inch Solid Partitions wherever outlets, etc., are shown on such partitions.

(NOTE:—To minimize sound conduction it is recommended that telephone boxes, etc., in adjoining hotel rooms, apartments, etc., be installed on outside walls of the room or on non-communicating partitions.)

(J) Plastering (Plastering Contractor)

(a) Plastering shall be gypsum, lime, Keene's cement, or portland cement or combinations of them and shall cover the nearest point or surface of Metal Lath by ⅝-inch of mortar. Where these partitions are used in positions where fire-retardant ratings of 1-hour or more are required *(by the Building Code)* regular sanded gypsum plaster shall be used, and partitions shall have a minimum total thickness of 2 inches. For positions where a 2-hour rating is required partitions shall be not less than 2 inches thick and shall be of unsanded wood-fibred gypsum plaster. 2¼-Inch Solid Partitions with proportions 1 part gypsum to ½ part sand also qualify for a 2-hour fire rating.

(b) Plastering shall always begin at bottom of the partition when height exceeds 9 feet to insure a straight and true wall. For lesser heights plastering, whenever possible, shall begin at bottom.

(c) Plastering shall extend down to floor line and be filled solid between all grounds; and, *(where required to insure minimum of sound transmission between rooms)* shall extend direct to underside of masonry ceiling slab.

(d) Where hollow metal bucks are used they shall be filled solid as plaster is carried upward.

(e) Temporary bracing shall not be removed until scratch coat on lath-side of partition has set. Scratch coat on channel side of partition shall not be applied until scratch coat on lath-side has set dry.

(NOTE:—Portland cement plaster is recommended for basement partitions, shower stall enclosures and elsewhere in which continued or large amounts of moisture are experienced. Gypsum plaster is subject to deterioration and should not be used where dampness is apt to be more or less frequently encountered. Plasters with lime or Keene's Cement content are recommended for these locations. However, for all other normal locations gypsum plaster is entirely satisfactory.)

No. 2. Specifications for Metal Lath and Plaster Hollow Partitions (Non-Bearing)

(Consult manufacturers' catalogs for specifications covering patented and other prefabricated Metal Stud Hollow Partition systems.)

(A) Weights of Metal Lath

All lath shall be specified by weight per square yard in accordance with the spacing of supports as given in the table below. Weights given are exclusive of paper, fibre, or other backing.

TYPE OF LATH	Weight: Lbs. per Sq. Yd.	Spacings of Metal Stud Supports, In.
Flat Expanded Lath	2.5	12*
	3.0	13½*
	3.4	16
Flat Rib Lath	2.75	16
	3.0	16
	3.4	19
	4.0	24
⅜-Inch Rib Lath or Lath of Equal Rigidity	3.0	24
	3.4	31½
	4.0	31½
Sheet Lath	4.5	24

* Permissible spacing 16 inches for wood stud partitions.

XXIV Specifications

XXV Plastering, Estimating

XXVI Miscellaneous Details

Appendix

(B) Size and Spacing of Studs

(a) Studs for Hollow Partitions shall be a single row of shop-fabricated or pre-assembled studs; a single row of cold-rolled channels or other structural shapes with width equal to that of the finished partition *(less the thickness of lath and plaster on each side)*; or shall be a double row of parallel studs made up of channels, each not less than a ¾-inch standard cold-rolled channel, or its equivalent, with suitable spacers or braces.

(b) Maximum spacing of channels along the face of the partition shall be in accordance with type and weight of lath as in **(A)** preceding.

(c) Minimum size of metal studs for Hollow Metal Stud Partition shall be in accordance with the following table:

TYPE OF PARTITION	Face-to-Face (A) Plaster Thickness In Inches	Maximum Height (B) In Feet
Single Row of 2" Studs	3½	20
Single Row of 3" Studs	4½	26
Single Row of 4" Studs	5½	32
Single Row of 6" Studs	7½	36
Double Row of ¾" Channels	3	18
Double Row of ¾" Channels	4	24
Double Row of ¾" Channels	5	30

(A) Plaster ¾-inch thick from stud face; for ⅝-inch plaster these figures reduce ¼-inch; for ⅜-Inch Rib Lath, with ribs against studs, thickness increases ½-inch.

(B) For lengths not exceeding 1½ times height. For lengths exceeding this reduce height 20%.

(d) Where double channels are used to form partitions, spacers or braces shall be provided between every pair. They shall be of substantial design and be spaced not more than 4 feet apart, *vertically*, and shall reduce to 2 feet spacing for heights exceeding 20 feet. *(No spacers required for shop fabricated studs or extra-wide channel studs.)*

(e) A ¾-inch horizontal stiffener channel with web horizontal shall be placed every 4 to 6 feet *horizontally* for all partitions more than 10 feet long, and also for those more than 9 feet high. Stiffeners to be permanently wired on inside of partition.

(C) Assembly of Partition Studs

(a), (b), (c), same as corresponding portions of Specification No. 1.

(d) A stud, continuous from floor to ceiling, shall in every case be placed adjacent to and at each side of vertical door bucks *(two pre-fabricated or four channel studs required per opening)* and shall be so placed that space is provided between them and bucks for tying ends of Metal Lath sheets to such studs. *(NOTE: Consult specifications of manufacturers of prefabricated studs for recommendations as to requirements at openings.)*

Where metal or metal and wood bucks are used, and excepting where such bucks dispense with need of studs directly against bucks, such studs shall be wire-tied to said bucks in a secure manner. Where wood bucks are used, two 8d nails shall be driven in pairs at intervals of 2 feet, beginning 9 inches above floor, into the wood buck, and clinched over the studs to hold them securely.

(e) All studding shall be spaced the proper distance along the face of the partitions, as called for in Article A preceding. Where double channels are used, spacers between opposite pairs of channels shall be well secured to maintain alignment.

(f) Refer to local building code for other requirements, if any.

(D) Erection of Metal Lath

(a) Metal Lath shall be applied to each side of the partition with the long dimension of sheet across the studs; Rib Metal Lath with the rib against the studs.

(b) Sheets shall be secured by wire ties at intervals not exceeding 6 inches, and a tie shall be placed where side of sheets lap at supports. *(NOTE: Ties on side laps between supports may be omitted for spacings of 13½ inches or less on flat lath and correspondingly greater distances for stiffened laths, at option of Contractor.)*

(c), (d), (e) and (f) same as Specification 1, Article D.

(E) Tie Wire

Same as Specification 1, Article E.

(F) Metal Base Screed, Picture Mold, Etc. (Lathing Contractor)

Same as Specification 1, Article F.

(G) Bucks (Carpenter Contractor)

(a) Same as Specification 1, Article G.

(b) Wood door bucks shall be full dimension and made from straight-grained lumber substantially free from knots. Bucks shall be of out-to-out dimensions which will permit trim to cover joint between buck and plaster at least 1-inch.

(c) and (d) Same as Specification 1, Article G.

(H) Wood Grounds (Carpenter Contractor)

(a) Wood strip grounds, when used, shall correspond to required plaster thickness *(less lath thickness)*, and shall be of 2-inch nominal width.

(b) Grounds shall be applied over Metal Lath and be well secured at studs by nailing to wood blocks secured to such studs, and be set by carpenter true-to-line and shimmed out where necessary. Such nailing blocks shall be spaced at not to exceed 24-inch centers.

(c) Other types of wood grounds for plaster thickness and for attachment of trim shall also be provided and set by this contractor.

(I) Electrical Conduit, Switch Boxes, Etc. (Electrical Contractor)

(a) Devices, outlets, etc., used for other types of partitions finishing 4½ inches and more in face-to-face thickness may be used in Hollow Metal Lath Partitions.

(J) Plastering

(a) Plastering shall be gypsum, lime, Keene's cement, Portland cement, or combinations of them; but where these partitions are used in positions requiring fire-retardant ratings of one hour or more *(by the Building Code)* gypsum or Portland Cement plaster shall be used. For 2-hour rating use ⅞-inch neat wood-fibred gypsum plaster, or 1-inch fibred gypsum plaster slightly sanded: 1 part gypsum to ½-part sand.

(b) and (c) Same as Specification 1, Article J.

(d) See note under Article J of Specification No. 1 in regard to *caution* against using gypsum plaster in moist localities or portions of buildings.

No. 3. Specifications for Metal Lath and Plaster Sound-Insulating Double Partitions

(A) Weights of Metal Lath

Same as Specification 2, Article A.

(B) Size, Spacing and Bracing of Studs

(a) Studs for Double Metal Lath Partitions shall be a double row of parallel studs made up of channels each not less than ¾-inch standard cold-rolled channels.

Maximum spacing of channels along the face of the partition shall be in accordance with type and weight of lath as in *(A)* above.

No spacers or cross ties which will in any way permanently connect the channels on opposite sides of the partition are permissible.

A 1-inch channel, or other member of at least equal rigidity shall be placed horizontally on the inside of the partition and be securely wired to each of the channel studs forming one face of the partition, and a similar channel or reinforcement shall be used to align and stiffen the channel studs on the other side. Such horizontal channels shall remain permanently in the partition and shall be so located that no part of them touches either the channels, the lath or the plaster keys of the other half of the partition. One such brace shall be applied every 4 feet in height of the partition, and at least two shall be provided for partitions 9½ feet high, or over. For school room partitions and elsewhere where required on account of nature of occupancy, three or more braces shall be provided.

In addition to the horizontal bracing specified in the preceding the following shall be provided for all partitions of this type more than 9½ feet high when more than 10 feet long:

At 10-foot intervals an additional channel stud or other vertical stiffener shall be supplied on the inside of the partition directly opposite the regular stud. It shall be installed so that the horizontal stiffener comes between it and the regular stud and at each of these points the two studs and horizontal stiffener shall be tied together. This is to be done independently on each half or face of the partition but no part of the construction shall run across or be tied to the other portion of the partition, the additional studs to be staggered for opposite faces of the partition.

(C) Assembly of Partition Studs

(a) Studs shall be erected by inserting ends into floor and ceiling runners. Floor runners shall be laid over ¾-inch thick machinery cork or other material having approximately equal resilient and load-carrying properties. *(NOTE: Wood floor runners of 1½-inch thickness have sound-insulating value approaching but not equal to cork.)*

Such cork, etc., shall be as wide as the finished thickness of the partition and shall be well secured to the floor slab. Rawl drives or other expansion bolts at 36-inch centers, or masonry nails which shall penetrate slab at least ⅝-inch and be spaced not to exceed 12 inches on centers, or combinations of the two, shall be used.

Attachments used for securing cork insulation to slab may be used simultaneously for securing and positioning floor runner, or separate attachments of the same type may be used for this purpose.

(b) For additional sound insulation, ceiling runner may be insulated from ceiling slab in manner similar to that described for floor runner in *(a)*, preceding. Otherwise upper ends of studs may be secured by any of the methods described in Specification 1, Article C, Paragraph (a.)

(c), (d) and (e) Same as corresponding parts of Specification 1, Article C.

(f) In erecting channel studding no part of same shall be wired or otherwise attached or permitted to make contact with piping, conduit, heat ducts, etc., within the partition.

(g) Lather shall see that each side of the partition is temporarily braced at intervals not exceeding 5 feet vertically until scratch coat of plaster has set.

(D) Erection of Metal Lath

(a) Same as Specification 2, Article D.

(b) Sheets shall be secured by wire ties at intervals not exceeding 6 inches, and a tie shall be placed where sides of sheets lap at supports, and on side-laps half way between supports; provided further, that ties of side-laps shall in every case occur at not to exceed 9-inch intervals.

(c), (d), (e) and (f) Same as Specification 1, Article D.

(g) In tying Metal Lath, no wire ties will be permitted from lath to piping, conduit, etc., within the partition or to any part of the lath and channels, on the opposite side of the partition.

(E) Tie Wire

Same as Specification 1, Article E.

(F) Metal Base Screed, Picture Mold, Etc. (Lathing Contractor)

Same as Specification 1, Article F.

(G) Bucks (Carpenter Contractor)

(a) Metal Door Bucks shall be erected in accordance with manufacturers' specifications. Where maximum sound insulation is desired, provide felt or cork-pad between buck and floor. Bucks shall be well anchored and secured by Rawl drives, through pads *(where used)*, and penetrate at least 1-inch into floor and ceiling slabs.

(b), (c) and (d) Same as Specification 2, Article G.

(e) *For maximum sound insulation a split or double-buck shall be used around entire opening with cork or other insulation between it and floor and between halves of bucks if connection is necessary. Provide sound-deadened casing around openings and "sound-proof" doors in openings.*

(H) Plastering

(a) Plaster shall be gypsum, lime, Keene's cement, or Portland cement or combinations of them.

NOTE: Acoustic plasters or finishes may be used in addition to scratch and brown coats of the plasters named. This will aid in controlling acoustics within room of origin.

(b) Plastering shall always begin at bottom of partition when height exceeds 9 feet in order to insure a straight and true wall. For lesser heights plastering, whenever possible, shall begin at bottom.

(c) Temporary bracing shall not be removed until scratch coats of plaster have set.

(d) Plastering shall extend down to floor line and be carefully filled between and back of all grounds, and in every case extend, uninterrupted, to underside of ceiling slab.

(e) For maximum sound insulation, a felt or cork pad should be attached to under side of ceiling slab and to upper side of floor slab so that plaster will stop against these instead of against masonry.

(f) *See note under Article J of Specification 1 in regard to* caution *against using gypsum plasters in continually wet or damp portions of buildings.*

CHAPTER XXV

Plastering Proportions, Surface Treatment, and Quantities for Estimating Lathing and Plastering

1. Proportioning Plaster Mixtures

Sand. The character of plastering sand has much to do with the amount necessary with a given amount of gypsum, lime, cement, etc. The proportions indicated below must be considered merely as averages. Actual experience only will determine the proper proportions for other types.

However, where fire-resistance requirements in excess of 1-hour ratings are to be met, the stipulations as to proportions of sand to cementitious materials, as given hereunder, are necessary. Building code requirements as to type and thickness of plaster necessary should also be consulted.

Mixtures for Scratch and Brown Coats. (Note): The plaster coat used to back-up the scratch coat on the lath side of Solid Partitions should be proportioned same as for brown coat.

Regular Sanded Gypsum Plaster. For scratch coat, use 100 lbs. gypsum to 200 lbs. sand; brown coats, 100 lbs. gypsum to 300 lbs. sand. This proportion used in ¾-inch plaster thickness assures 1-hour fire rating for **Metal Lath Hollow Partitions. For 1-hour fire rating for 2-inch Solid Metal Lath Partitions** proportions are 100 lb. gypsum to 200 lbs. sand for all coats.

Lightly Sanded Gypsum Plaster. (For 2-hour fire ratings): For all coats, **(except finish coat)** 100 lbs. sisal fibred gypsum to 50 lbs. sand for **both 2¼-inch Solid and 5-inch Metal Lath Hollow Partitions.**

Unsanded Wood Fibred Gypsum Plaster. (For 2 to 3-hour fire ratings, depending on plaster thickness, 2 in.—2 hours; 2¼ in.—2⅝ hours, for Solid Partitions.) For all coats **(except finish coat)** neat wood fibred gypsum containing 2% wood fibre. (⅞-inch thickness each side required for 2-hour rating for Hollow Partitions.) 2% wood fibre greatly increases workability and coverage, as compared with usual 1%. Inclusion of up to equivalent of sand by weight (1:1) will give ratings of approximately 1½ hours for Solid Metal Lath Partitions.

Vermiculite Plaster. For **superior** fire-resistive ratings use in proportions according to manufacturer's directions.

Lime Plaster. Scratch coat: 1-part composed of 80% stiff lime putty to 20% Keene's Cement, to 3 parts dry plastering sand; 6 lbs. hair per cu. yd. of mortar. For brown coats: 1-part composed of 90% stiff lime putty to 10% Keene's Cement, to 4 parts dry plastering sand; 3 lbs. hair per cu. yd. mortar. Fibred Lime plasters with admixtures of Keene's Cement or portland cement for quick-hardening are also available. See manufacturer's specifications for recommended proportions.

Portland Cement Plaster. For scratch coat: 1-part portland cement to 3 parts of sand; brown coats, same proportions. Use hydrated lime in amount 10% by weight of cement. Add also short asbestos fibre 3% by weight of cement, to make **"fatter"**, more easily worked and more fire-resistive mixture. (Same mixtures for exterior work, except lime content may be up to 15% by weight of cement.)

Keene's Cement Plaster. For scratch coat: 10 cu. ft. stiff, aged lime putty; 200 lbs. Keene's Cement; 1-lb. hair or fibre; 1-cu. yd. sand. For brown coat: 7 cu. ft. stiff. aged lime putty; 150 lbs. Keene's Cement; 1-cu. yd. clean. sharp sand.

Hair or Fibre for Sanded Gypsum and Portland Cement Plaster. For scratch coats on Metal Lath use hair or fibre not to exceed 3 bushels per cu. yd. of sand. In the case of gypsum, if double fibred gypsum is available use this for scratch coat without admixture of added fibre. For brown coats use regular fibred or neat gypsum.

Finish Coats for All Base Coats (Interior Use). For the usual white smooth finish, lime putty and gypsum are mixed in proportions left largely to the discretion of the plasterer who must gauge the time of set by job conditions, by the condition of the weather, and the type of finishing lime used. Proportions recommended by the American Standards Association are 3 parts of lime putty to 1-part of gaging plaster by volume. The Finishing Lime Association of Ohio, composed of manufacturers of lime plasters, recommends proportions utilizing up to 5 or 6 parts of their lime putty to 1-part of gaging plaster.

Also available are self-colored Keene's cement plaster finish coats. Sand finishes made with gypsum or portland cement plasters are also widely used.

2. Application of Plaster

Two-Inch Solid Metal Lath Partitions should be braced on channel side once in every 6 ft. of their height. The bracing is removed after the scratch coat has set. Hollow Partitions are self-braced, while in Metal Lath Double Partitions, which have no cross ties between the faces, temporary braces should be provided on each face. Bracing using 2x4's is recommended for unsanded gypsum plaster.

(a) Solid Metal Lath Partitions. Experienced plasterers find it more economical to make this a 5-coat job, but occasionally 6 coats are used. As these partitions are plastered solidly and a 2-inch thickness required in any case, nothing is gained by putting on a thin scratch coat.

The scratch coat should cover the face of the lath about one-quarter inch and should be pushed well through the lath to make large keys on the face side. Before it has hardened the face should be well scratched diagonally in both directions to a depth of ⅛-inch or more.

When it has hardened sufficiently *(usually in 12 hours)* it is ready for the backing-up coat. *Under no circumstances should the backing-up coat be applied until the scratch coat has hardened, since pressure of the trowel may break the keys of the latter.* The backing-up coat is usually applied in two operations, the second following immediately after the plaster first applied has stiffened. This brings the plaster out beyond the face of the channels where it is rodded and darbied, being actually the brown or straightening coat on this side of the partition.

Hollow Metal bucks should be well-filled with plaster.

The brown coat on the lath side follows immediately after backing-up coat has set, and then in turn come the finishing coats or other decorative finishes on each side.

(b) Hollow and Double Partitions. In all types of Metal Lath Hollow and Double Partitions 3-coat plastering is recommended. For some types of lath the first two coats are applied the same day. However, best results are obtained using three distinct operations on different days. A minimum thickness of ¾-inch measured from the back of the lath mesh is recommended; the surface of lath nearest the finish face should be covered by not less than ⅝-inch of plaster.

(c) For Sound Insulation. The portion of partition between baseboard grounds and the floor *should always be fully plastered. Where integral base is used in Solid Partitions this should be slushed full with plaster or cement grout.* Metal Lath Partitions should be carried to and plastered up to the underside of the ceiling slab, instead of stopping at the ceiling plaster line in the case of suspended or furred ceilings.

3. What Plaster To Use

(a) For Average Interior Use. Any of the plasters heretofore mentioned may be used on Metal Lath Partitions with assurance of long life and general freedom from cracking. However, since soaking moisture will, in time, deteriorate gypsum plaster and this in turn affects the Metal Lath, this type of plaster, although satisfactory for other positions, should not be used for places which are continuously wet or damp. Portland cement, lime plaster or Keene's cement plaster which are inhibitors of corrosion should be used. This applies, particularly, to bathrooms, toilet and washroms, shower rooms and laundries.

Asbestos Portland Cement Mixtures. It was found at the Bureau of Standards that by adding short fibred asbestos in the proportion of 3 lbs. to 100 lbs. of portland cement, with 10% by weight of hydrated lime, the fire resistance of portland cement plastered partitions is increased materially. Furthermore, the asbestos admixture improves the workability and facilitates the application of the plaster.

Lightly Sanded Gypsum Plasters. The use of small quantities of sand in the proportion of 1 part of sand to 2 parts of gypsum (reversing customary proportions) is permissible where partitions having a 2-hour fire resistive rating are desired. **(See Article 1.)** This small proportion of sand prevents the sticking of the plaster to the trowel—a common experience where neat plasters are used.

(b) Plasters for Other Parts of Buildings. For basement partitions, cold storage rooms, etc.: portland cement either "straight" or gaged with lime; do not use gypsum.

For jails and other detention buildings, chemical laboratories, X-Ray film storage, exposed factory partitions, for belt and shaftway enclosures: Portland Cement. (When exposed to severe service conditions, a further treatment of the plastered surface with waterproofing paints or by chemical hardeners may be necessary.)

For spandrel walls of houses, factories, tourist camps, filling stations, fences etc.: Portland Cement plaster or prepared Portland Cement stuccos. Magnesite (magnesium-oxychloride) exterior stuccos, as made up to now, are not recommended for use on Metal Lath.

For resistance to explosion or impact: Portland Cement plaster.

For sound insulation: All plasters are about equally good. **For sound absorption:** Use acoustical plaster. **For X-Ray Treatment rooms:** Use barium plaster.

4. Curing Or Proper Dehydration of Plastering Essential

After the completion of plastering it is customary to permit the moisture, in the form of excess mixing water in the plastering, to dry out before the application of wood trim is begun. For gypsum and portland cement plastering, from 10 days to 2 weeks is usually given for the completion of the necessary dehydration. Free circulation of air is essential and this is particularly important when the atmospheric conditions prevailing tend to a considerable degree of humidity. In cold weather, drying is hastened by the circulation of warm air, preferably by steam or hot water radiators or by suitably enclosed salamanders. Suitable provision for the escape of moisture driven off, should be made.

Paints, particularly of the lead and oil type, should not be applied on plaster surfaces that have not dried out thoroughly, as this seals in the moisture and under certain conditions it may have a detrimental effect on both plaster and plaster base. Where a temporary finish is needed immediately, a kalsomine or similar coating is recommended. Furthermore, in the case of lime plaster base coats a delay of as much as six months before application of oil paints is advisable in order to afford the carbon dioxide in the air adequate facilities to reach and carbonate and thus harden the lime in the plaster. Proper drying-out also assures adherence of wall paper and similar surfacings applied with the usual adhesives.

5. Painting and Decorating Plastered Surfaces

A coat of waterproofing size is applied to the dried plaster. This serves to neutralize free lime on the surface and as a base for subsequent paint or other finishes. The use of aluminum or similar metallic paint undercoats in rooms where a considerable amount of moisture is expected, and as vapor barriers for furred plaster on exterior walls, merits consideration.

A great variety of finishing coats are available, the most commonly used being lead and oil paints or kalsomine. To make the former easily washable, glazing is frequently used. Kalsomine, applied over a sizing coat, is readily removed with a cloth and hot water and may be renewed an infinite number of times. It, however, is not as satisfactory a protection for the plaster as lead and oil paints.

Washable Plaster Surfaces. To reduce the expense involved in the regular cleaning of plastered and painted surfaces, building managers find that by applying a thin transparent coat of starch over the paint, in subsequent cleaning to renew its original appearance, hot water will remove the starch and dust which may have settled on the surface. A new application of starch renews the surface for use for another year, without requiring any attention whatever to the paint itself.

Another treatment which seals the pores of plaster, will keep it clean for long periods of time and bring out the full richness of the colors, consists of spraying or brushing the plaster after it has thoroughly set with either a solution of soapy water or a 6% solution of milk. After the plaster has been treated in this way it will not absorb dirt, and moisture stains will not collect on its surface as on untreated surfaces. The richness which it gives to the colors is also most satisfactory. *(Northwest Plastering Industries Magazine.)*

Where an especially hard, durable, and washable plaster surface is desired, the use of Keene's or portland cement plaster is recommended. These can be troweled to a smooth, slick finish which, in the case of portland cement, can be made well-nigh impervious to water and can be hosed off as occasion requires. Soap-and-alum or chemical hardeners are used to make portland cement surfaces dense and impermeable. Wax finishes applied to such surfaces makes them glossy and decorative.

Sand float finishes are much in vogue where a soft background for wall decorations is desired, and for certain types of detention buildings. They are somewhat more sound-absorbent than the usual *"hard wall"* finishes but do not lend themselves so readily to cleaning.

Self-decorated Plaster. Many attractive colored plastered finishes are now obtainable by incorporating coloring pigments directly into the plaster and sand used for the finish coat. This, naturally, eliminates painting later and permits the building to be occupied without waiting for the plaster to become perfectly dry. By suitable trowelling, the finish coat may be so applied that all manner of color-mottled and textured effects are obtained.

Wall Paper and Similar Finishes. Besides the usual wall papers used for decorative effect only, there are available various types of waterprooted papers and fabrics. The durability of all of these is increased by the use of crack-resistive Metal Lath and Plaster partitions. Likewise, strikingly beautiful treatment may be obtained by applying paper-thin wood veneers over the crack-resistive base construction.

6. Quantities

(100 Square Yards Finished Surface Both Sides Included)

(A) Two-Inch Solid Partitions:

Plastering Materials

Regular Sanded Gypsum Plaster (Smooth white finish): Proportion by weight, 1:2 scratch; 1:3 for brown coats. 4500 lb. gypsum plaster; 10400 lb. (4.0 cu. yds.) plastering sand; 800 lb. finishing lime; 300 lb. gauging plaster. Use double fibred gypsum in scratch coat only or add extra fibre.

Lightly Sanded Wood Fibred Gypsum Plaster (Smooth white finish): Sanded 1 part gypsum to ½ part sand; 7600 lb. wood fibred gypsum plaster; 3500 lb. (1.2 cu. yds.) plastering sand; 800 lb. finishing lime; 300 lb. gauging plaster.

Portland Cement Plaster: Proportions: 1:3 by weight or volume, all coats: 4400 lb. portland cement; 440 lb. hydrated lime; 13500 lb. (5.2 cu. yds.) plastering sand; 800 lb. finishing lime, 300 lb. gauging plaster for smooth white finish; or 630 lb. portland cement, 1900 lb. (.75 cu. yd.) sand, 65 lb. finishing lime for sanded finish.

Note: For partitions of greater thickness multiply above quantities **(except for finishing lime and gaging plaster and other finish materials which remain constant irrespective of thickness)** by following factors: for 2¼-inch by 1.125, for 2½-inch by 1.250, etc.

Sand assumed to weighs 2600 lb. per cu. yd.; portland cement, 94 lb. per cu. ft.

Lathing Materials

Const. Type A. Stud ends set in floor and ceiling track channels:

Metal Lath, 107 sq. yds.

Channels: ¾-in. C. R. @ 276 lb. per 1000 ft. for partitions up to 14 ft. high; 1-in. C. R. @ 332 lb. for partitions 14 to 20 ft. high; 1½-in. C. R. @ 442 lb. for partitions over 20 ft. high.

Footage of studs, and perforated channel floor and ceiling runners for 12, 16, 19 and 23½-inch spacings, are 1100, 880, 775 and 655 lineal feet respectively.

Const. Type B. Without track at top and bottom but allowing for top and bottom ends of studs to be set 1 inch each into floor and ceiling slab or Metal Lath ceiling. Footage of studs for 12, 16, 19 and 23½-inch spacings, are 930, 700, 585 and 465 lineal feet respectively.

Const. Type C. Where special floor and ceiling runners are used (instead of standard track channels) deduct 2 per cent from quantities in (B) and add 100 ft. top runner and 100 ft. bottom runner.

Reinforcements at Openings. Add 22 feet of channel studs and 6 ft. of ⅛ x 1¼-inch flat bar (or ⅜-inch diameter rod) for each opening to the quantities in A, B and C constructions.

Tie Wire. Quantity of 18-gage galvanized annealed, required for respective stud spacings of 12, 16, 19 and 23½ inches: 15, 11¼, 9½ and 7½ lbs.

Masonry Nails, Rawl Drives, Etc. 135—¾-inch masonry nails 18 inches on centers, or 68—¼ x 1½-inch Rawl Drives at 3 feet on centers per 100 sq. yds. of partition for anchoring floor and ceiling runners to masonry. **(Not required where studs are set into holes in masonry or into Metal Lath on ceiling.)**

(B) Hollow and Double Metal Stud and Metal Lath Partitions

Plastering Materials

Note: Total quantities for plastering materials for Hollow Partitions where plaster is ¾-inch thick measured from back face of lath are approximately the same as given for 2-Inch Solid Partitions. However, because two scratch coats are required instead of one, the gross amount of cementitious material **(gypsum, etc.)** will be about 10% more, with a corresponding lessening in sand requirements. Quantities will vary also with thickness of plaster specified.

Lathing Materials

Lath quantities for these types of construction are ex-

actly double those previously given for Solid Partitions.

Const. Type D. (Consult Catalogs of Manufacturers of Pre-Assembled Stud Systems.) The following figures are approximate only:

Where pre-assembled stud units (fabricated from one-piece of sheet or structural steel or shop welded from 2 or more pieces of channel iron or rod stud material) are used for Hollow Partitions footage of studs for 12, 16, 19 and 23½-inch spacings are approximately 910, 685, 575 and 455 lineal feet respectively plus 100 feet top runner and plus 100 feet bottom runner. Also include 1 lin. ft. of ¾-in. or 1-in. C. R. channels for each lineal foot of partition to be used as permanent horizontal stiffeners for every 5 ft. in height of partition in all partitions more than 9 ft. high or over 10 ft. long; (Permanent stiffeners may be omitted if ⅜-inch or Sheet Metal Lath is used). Also include top and bottom stud shoes if required by particular system of erection.

Tie Wire. For stud spacings of 12, 16, 19 and 23½ inches on center respectively, quantities required are as follows: 30, 22½, 19 and 15 lbs. respectively.

Masonry Nails or Expansion Drive Bolts are required for anchoring floor and ceiling runners to masonry floors. **(Note quantity is approximately the same for prefabricated stud partitions as for Solid Partitions.)**

Const. Type E. Where double ¾-inch channel studs are used, channel stud quantities also are exactly double those given for Solid Partitions.

In addition, provide 2 lineal ft. of ¾-in. or 1-in. C. R. channel for each lineal foot of partition to be used as horizontal stiffener channels for every 5 ft. in height for all partitions more than 9 ft. high; and, irrespective of height, for all partitions over 10 ft. long. (Such permanent stiffeners may be omitted for Hollow Partitions only, if ⅜-inch Rib or Sheet Metal Lath is used.)

Where stiffener can be tied to both studs in each pair, only 1 lin. ft. of stiffener channel is required per foot of partition per 5 ft. height. For Double (Sound-Insulating) Partitions permanent horizontal stiffeners should be provided independently for each side.

Provide in addition, **for Hollow Partitions only,** separators spaced not to exceed 4 feet on center for each pair studs when partition height does not exceed 9 ft.; 3½ ft. on centers for partitions 9 ft. and not exceeding 12 ft. high; 3 ft. on centers for partitions 13 to 16 ft.; 2½ ft. on centers for partitions 17 to 20 ft. high. For heights from 21 to 30 ft. separators in upper half shall not exceed 2½ ft. on centers, in lower half not to exceed 2 ft. on center. Separators are not used for Double Partitions.

Tie Wire. For stud spacings of 12, 16, 19 and 23½ inches on center respectively, quantities required are as follows: 30, 22½, 19 and 15 lbs., respectively.

Masonry Nails or Expansion Drive Bolts for anchoring floor and ceiling runners, where separate runners are used for each line of studs, are substantially double those shown for Solid Partitions.

CHAPTER XXVI
Miscellaneous Construction Details

Cross Sections of typical details given in the pages following are ¼ full-size. Full size details are available, at nominal cost, upon application to the publishers of this book.

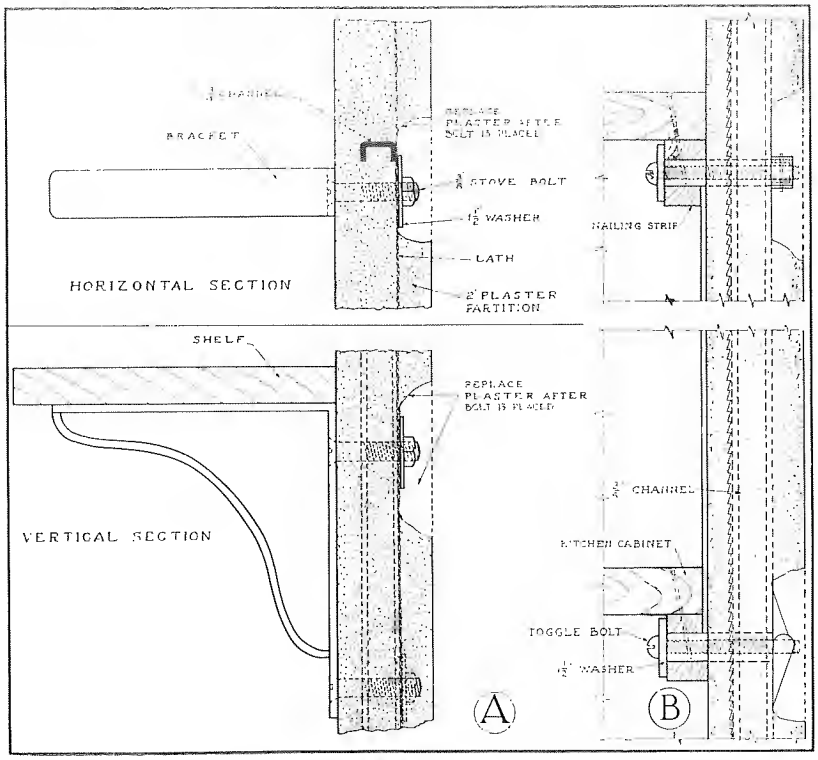


Fig. 206-A. Attachment of Shelving Brackets to Solid Metal Lath Partitions by Bolting. Fig. 206-B Continuous Toggle-Bolt Attached Wood Nailing Strip for Securing Wood Kitchen Cabinets to Partitions.

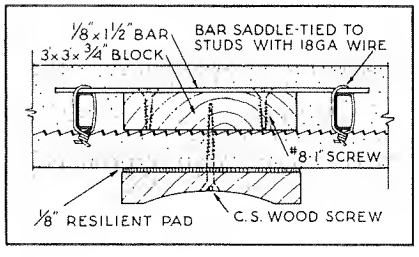


Fig. 208. (Left) Suggested Detail for Attachment of Door Bumper and Resilient Pad to 2-Inch Solid Metal Lath Partitions.

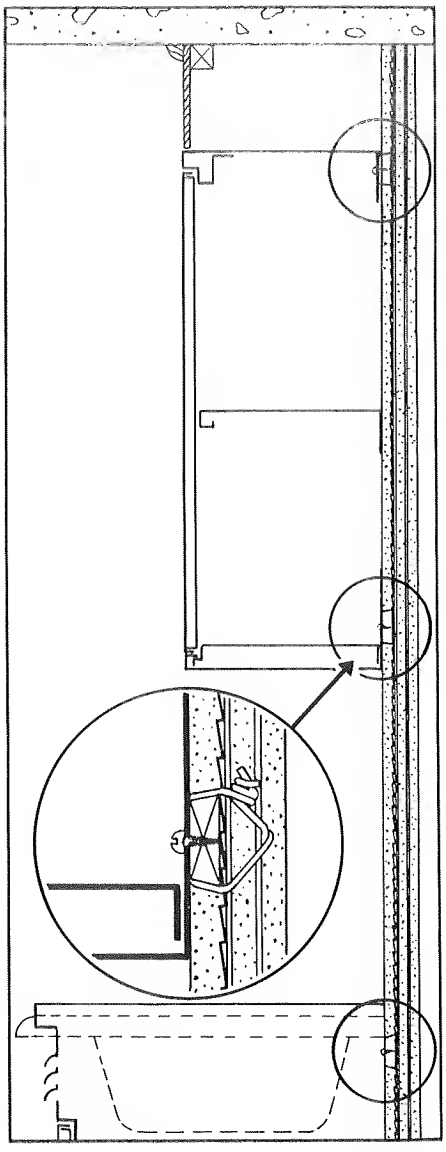


Fig. 207. (Right) Steel Kitchen Cabinets and Sink Enclosures Attached by screws into flush beveled Wood Grounds wire tied to lath and channels, (Parkchester Housing Development, New York City).

MISCELLANEOUS CONSTRUCTION DETAILS

Fig. 209. (Above and Along Left Margin Below) 2-Inch Solid Portland Cement and Metal Lath for Shower Rooms.

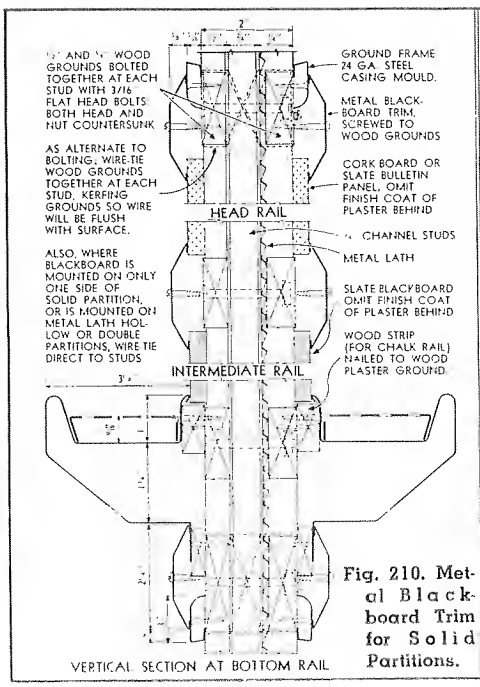


Fig. 210. Metal Blackboard Trim for Solid Partitions.

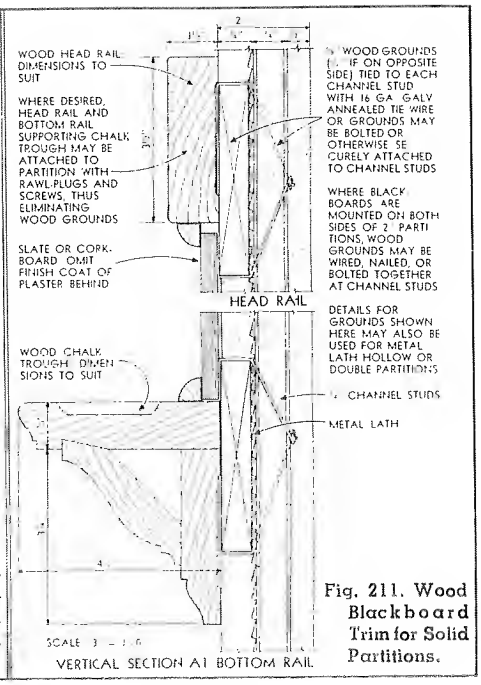
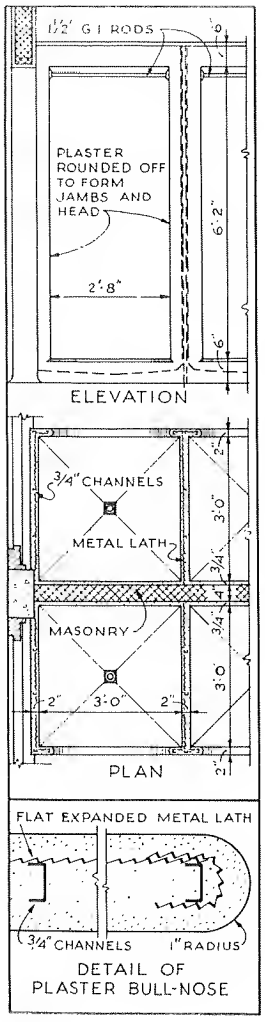
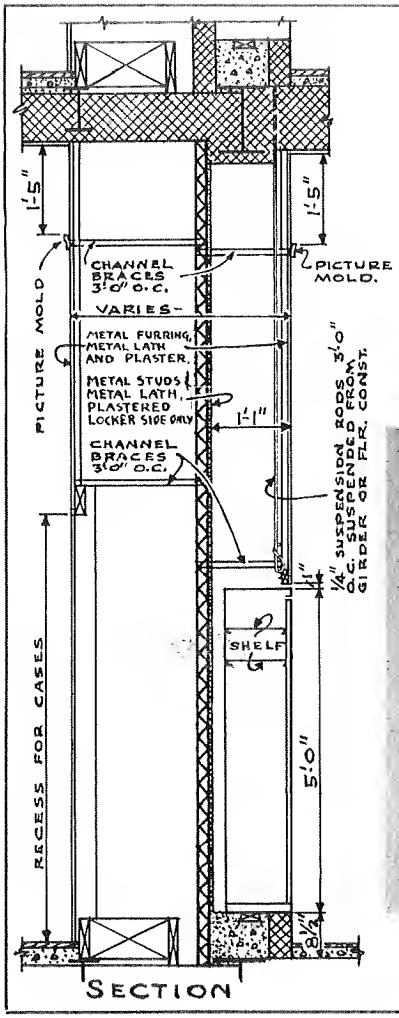
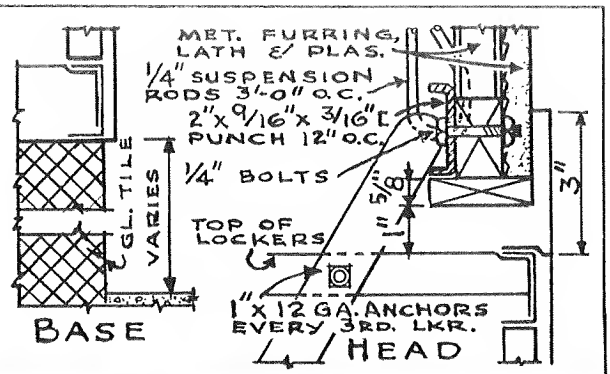


Fig. 211. Wood Blackboard Trim for Solid Partitions.







Quarter Size Sectional Details at Head and Base of Lockers.

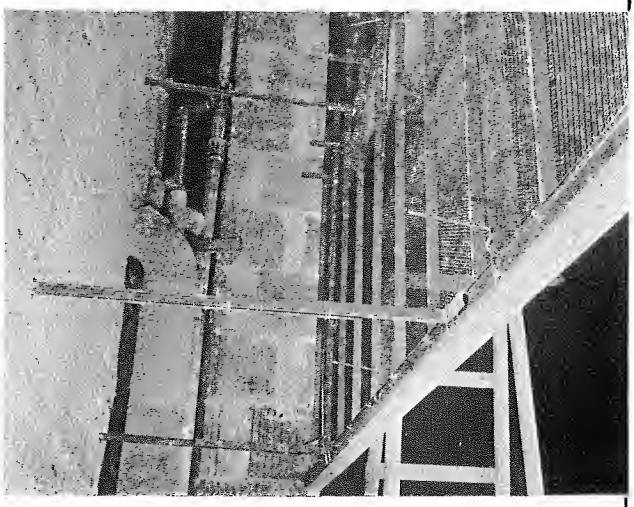


Fig. 212. Metal Lath Construction Around Schoolroom Wall Cases and Lockers.

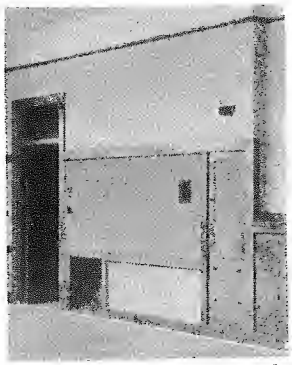


Fig. 213. (Above) Blackboard Installation, Heberle School, Cincinnati. Gustave Drach, Archt.

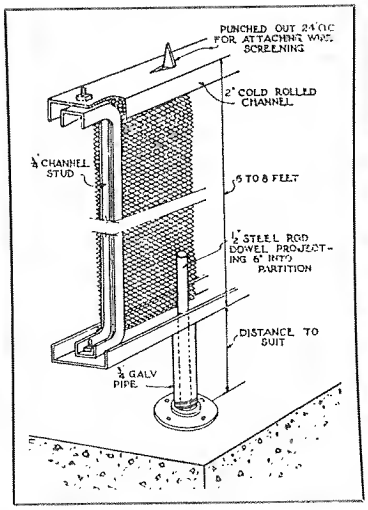


Fig. 214. (Right) Solid Partition with Floor and Ceiling Clearance.

Fig. 215. Solid Partitions (detailed in Fig. 214) in Chicago, Lodging House. M. O. Nathan, Archt.

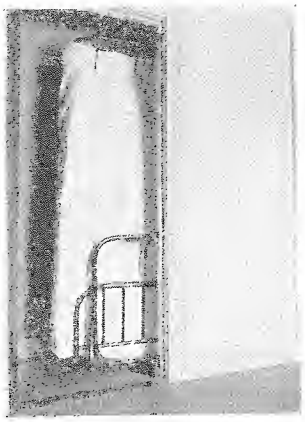


Fig. 216. Concealed Beds on Texas Dormitory Solid Partitions. Greene, La Roche and Dahl, Archts.

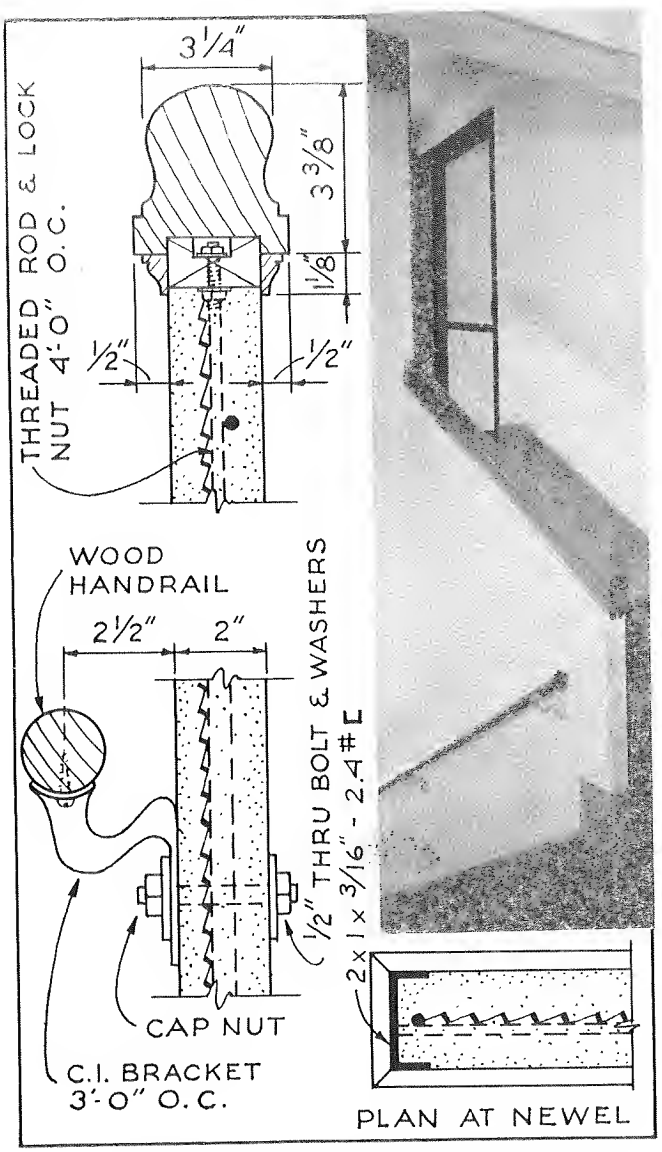


Fig. 217. Two-Inch Solid Plaster Stair Railing with Wood Hand Rail Attached. (In Minnesota School Building.) J. C. Niemeyer, Archt.

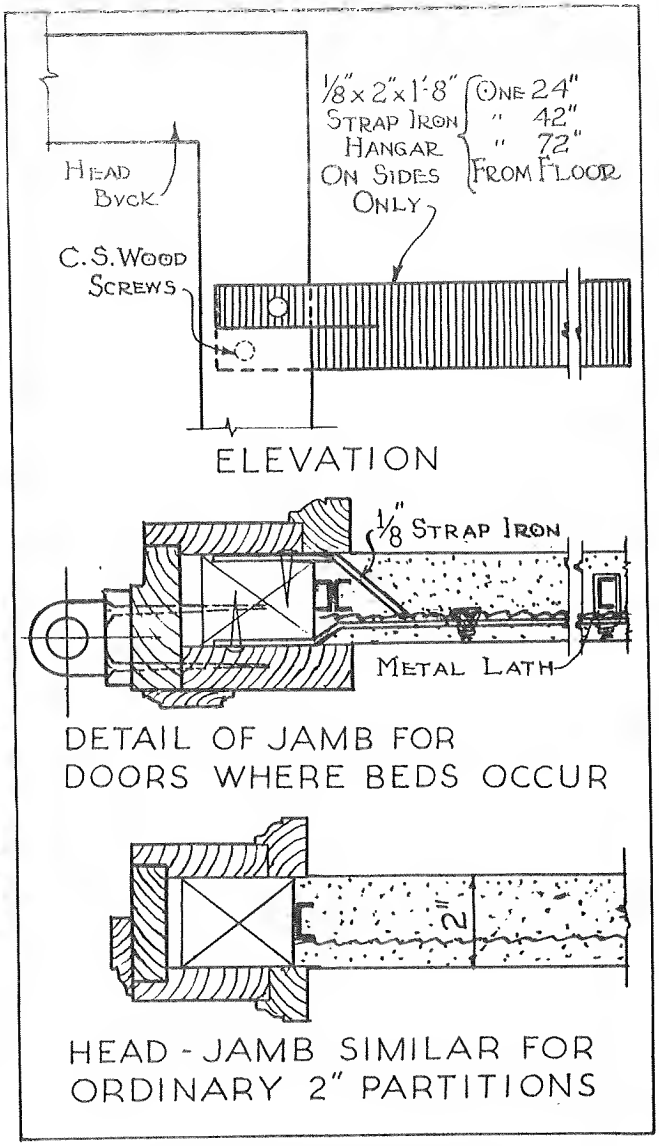


Fig. 218. Typical Buck Construction and Anchorage for Wall-Hung Concealed Beds Attached to 2-Inch Solid Metal Lath and Plaster Partitions.

MISCELLANEOUS CONSTRUCTION DETAILS

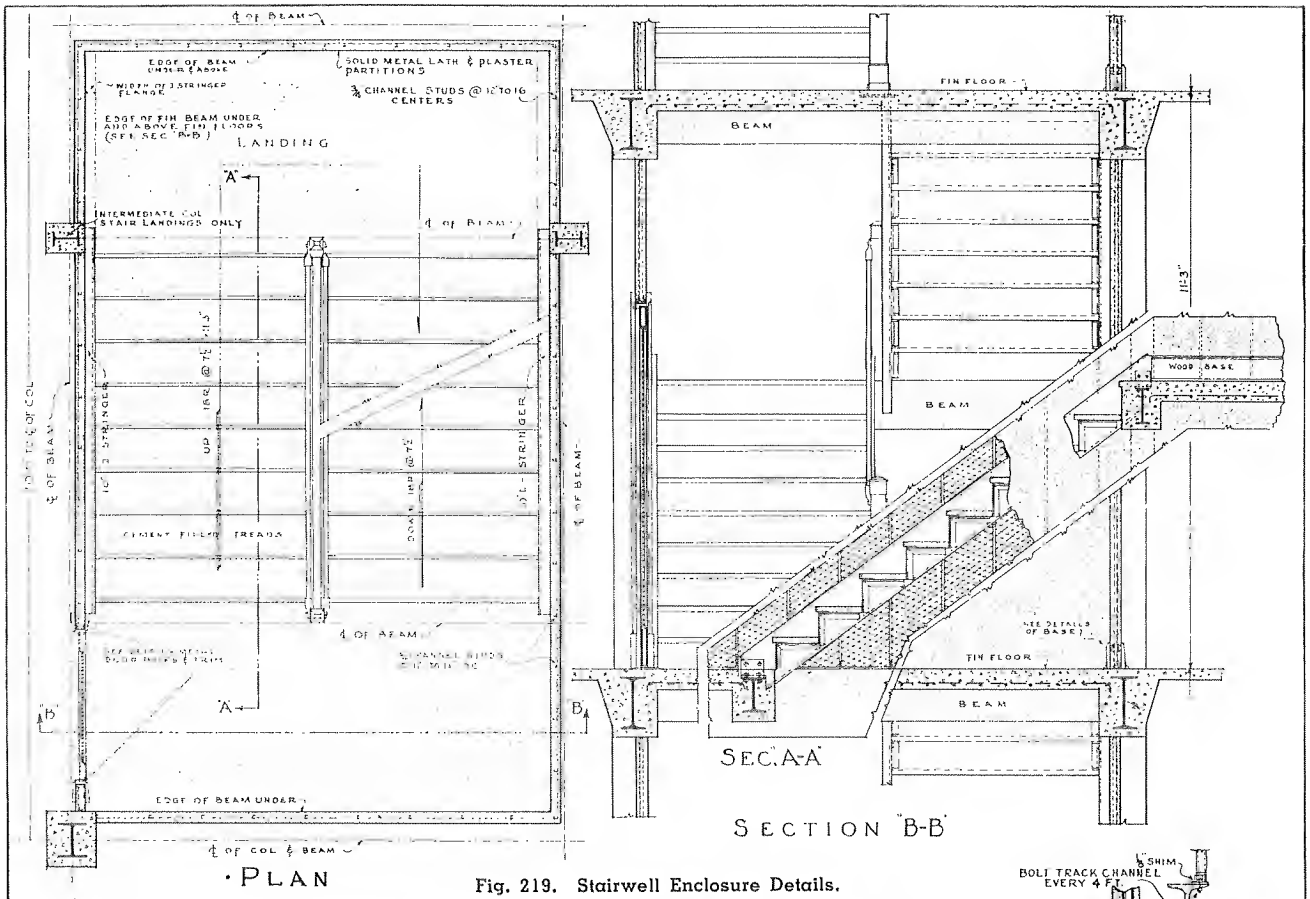


Fig. 219. Stairwell Enclosure Details.

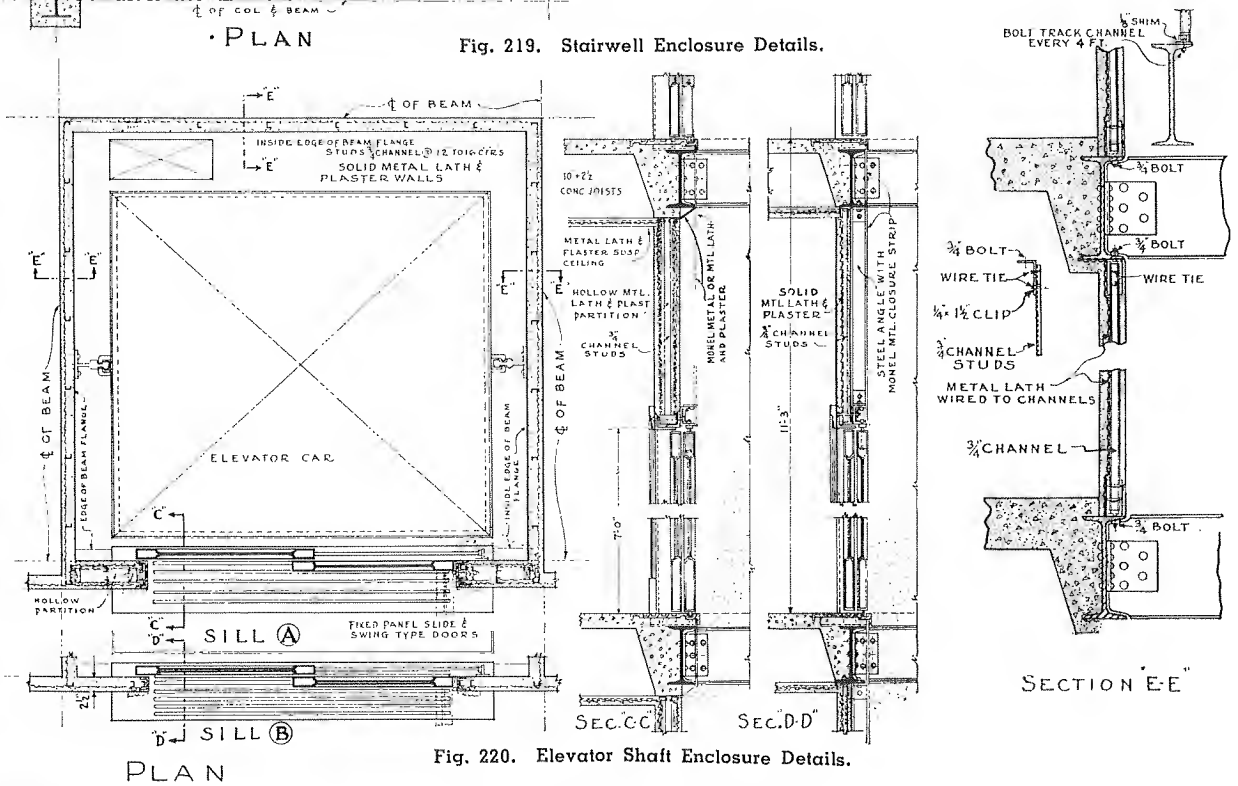


Fig. 220. Elevator Shaft Enclosure Details.

Figures 219 and 220. Stairwell and Elevator Shaft Enclosure Details.

For 1-hour Standard Fire Retardant Enclosures use 2-Inch Solid Metal Lath or 4½-Inch Metal Lath Hollow Partitions with Regular Sanded Gypsum Plaster. Well-scratched Asbestos Fibred Portland Cement Plaster may be used for the Scratch Coat.

For 2-hour Standard Fire Retardant Enclosures use 2-Inch Solid Metal Lath or 5-Inch Metal Lath Hollow Partitions with Unsanded Wood Fibred Gypsum Plaster, or 2¼ Inch Solid or 5-Inch Hollow Partitions with Lightly Sanded Fibred Gypsum Plaster.

APPENDIX

List of Manufacturers of Metal Lath Industry Products and of Metal Bucks, Electrical and Attachment Devices and Appliances and Details Used in the construction of various types of Metal Lath Partitions.

Also included are manufacturers of various devices illustrated in this Handbook which are referred to by figure number.

(Note: Due to limitations on size of this book, it is not possible to print a complete list of names of manufacturers of accessory products and devices, and it is recommended that SWEET'S CATALOG be consulted.)

1. Metal Lath, including Deep Rib and Deep Corrugated Lath, Channels, Prefabricated Studs and Track Systems, Corner Beads, Base Screeds, Metal Base, Picture Mould, Tie Wire, Concrete Nails & Other Accessories

Berger Manufacturing Company
1038 Belden Avenue, N. E.
Canton, Ohio

Bostwick Steel Lath Company
Niles, Ohio

Ceco Steel Products Corp.
5701 W. 26th Street
Chicago, Ill.

Consolidated Expanded Metal Companies
Steelcrete Building
Wheeling, W. Va.

Goldsmith Metal Lath Company
4501 Chickering Avenue
Cincinnati, Ohio

Milcor Steel Company
41st & Burnham Streets
Milwaukee, Wis.

National Gypsum Company
Buffalo, N. Y.

Penn Metal Company, Inc.
40 Central Street
Boston, Mass.

Truscon Steel Company
Youngstown, Ohio

United States Gypsum Company
300 West Adams Street
Chicago, Ill.

Wheeling Corrugating Company
Wheeling, W. Va.

2. Metal Bucks and Door Frames

Aetna Steel Products Corp.
101 Richard Street
Brooklyn, N. Y.

Art Metal Construction Co.
Jamestown, N. Y.

Atlantic Metal Products Co.
New York, N. Y.

Dahlstrom Metallic Door Co.
Jamestown, N. Y.

Debold Safe & Lock Co.
Akron, Ohio

Goldsmith Metal Lath Co.
Cincinnati, O.

Johnson Metal Products Co.
New York, N. Y.

Knapp Bros. Mfg. Co.
Joliet, Ill.

Lawton-Stephens Co.
Brooklyn, N. Y.

Superior Firepf. Door & Sash Co.
Bronx, N. Y.

Triangle Steel Products Corp.
245 Russell St.
Brooklyn, N. Y.

World Steel Products Corp.
448 Tiffany St.
New York, N. Y.

3. Metal Trim, Door Casings, Etc.

Milcor Steel Co.
Milwaukee, Wis.

Knapp Bros. Mfg. Co.
Joliet, Ill.

4. Furring Anchors, Inserts and Devices

(Figures below refer to Handbook illustrations.)

Fig. 126. Nailing Blocks and Wire Clips, Henderson System
Rawlplug, Chicago, Co.
2621 S. Cottage Grove,
Chicago, Ill.

Fig. 197. Furring Inserts and Spacers
Goldsmith Metal Lath Co.
Cincinnati, Ohio

Fig. 198. Taylor Furring System for Masonry Walls
Simplon Products Corp.
551 Fifth Ave.
New York, N. Y.

Fig. 199. K-M Adjustable Wall Furring Anchors
K-M Building Products Co.
Milwaukee, Wis.

Fig. 200. Simp-L-On Adjustable Anchor and Wall Furring System for Masonry Walls
Simplon Products Corp.
551 Fifth Ave.
New York, N. Y.

Fig. 201. Pronged Furring Members
United States Gypsum Company
300 W. Adams St.
Chicago, Ill.

Wall Furring System
Penn Metal Company, Inc.
40 Central Street
Boston, Mass.

Adjustable Furring Anchor
Reed Clip
Universal Form Clamp Co.
Chicago, Ill.

5. Expansion Bolts, Drives, Etc.

Ackerman-Johnson Company
Chicago, Ill.

Ankyra Mfg. Co.
Philadelphia, Pa.

The Rawlplug Company, Inc.
New York, N. Y.

Star Expansion Bolt Co.
New York, N. Y.

6. Access Panels

Higgin Manufacturing Co.
Newport, Ky.

F. H. Lawson Co.
Cincinnati, O.

Milcor Steel Co.
Milwaukee, Wis.

7. Shallow Electrical Devices for Solid Metal Lath Partitions

Appleton Electric Co.
1701 Wellington Ave.
Chicago, Ill.

Arrow Electric Co.
Hartford, Conn.

I. A. Bennett & Co.
735 W. Jackson Blvd.
Chicago, Ill.

Connecticut Electric Mfg. Co.
Bridgeport, Conn.

Hart & Hegeman Mfg. Co.
Hartford, Conn.

National Metal Moulding Co.
1386 Fulton Bldg.
Pittsburgh, Pa.

8. Metal Base for Conduit, Etc.

Knapp Bros. Mfg. Co.
Joliet, Ill.

Wiremold Company
Hartford, Conn.

9. Metal Blackboard Trim

Knapp Bros. Mfg. Co.
Joliet, Ill.

Milcor Steel Co.
Milwaukee, Wis.

10. Medicine Cabinets, Soap Holders, Towel Racks, Grab Rails

The Fairfacts Company
New York, N. Y.

Hess Warming & Ventilating Co.
Chicago, Ill.

Hoegger, Inc.
Jersey City, N. J.

Kraftile Co.
Niles Alamada County, Cal.

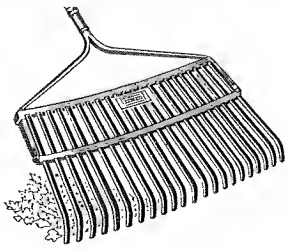
Youngstown Pressed Steel Co.
Warren, Ohio

11. Sanitary Fixtures, Adjustable

Fee and Mason
New York, N. Y.

J. A. Zurn Mfg. Co.
Erie, Pa.

"LAWNCOMB" RAKE

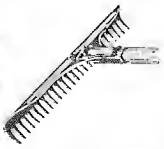


Flexible flat spring-steel teeth. Every tooth touches the ground without forceful pressure. Will not dig in and injure grass or roots.

Widths: 18 and 24 in.

Each .....$1.15 and $1.25

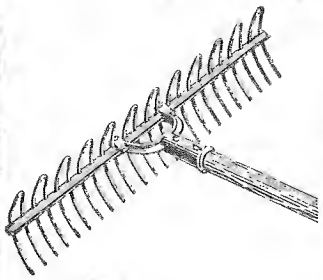
DANDELION RAKE



Cuts off the blossoms before the seeds can mature, and without injury to grass roots. Brings up crab grass for mowing.

	Each
No. LDR —15½ in., steel head	$1.10
No. LDRW—Wide pattern, 22¾ in.	1.30

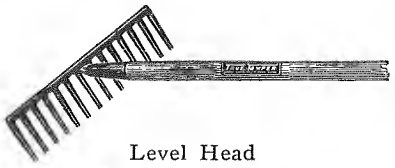
WIRE RAKE



Malleable iron bracket — spring steel wire teeth — selected hardwood handle, nicely finished.

Price: 24 teeth, 21 inches wide	$0.95
Price: 28 teeth, 24½ inches wide	1.30
Price: 36 teeth, 31 inches wide	1.75

STEEL RAKE

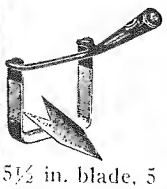


Level Head

Bow Rake

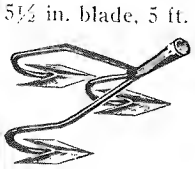
Price: 10 teeth, 10 inches wide	$1.20
Price: 14 teeth, 14 inches wide	1.30
Price: 16 teeth, 16 inches wide	1.40

PULL HOE



The V-shaped blade bites into the ground with an easy pull as you walk along, weeding and leaving soil finely mulched without exposing moisture to the sun.

5½ in. blade, 5 ft. handle.....Each $1.50



HAND CULTIVATORS

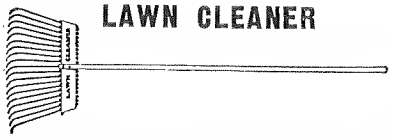
Gardex Hand Cultivator

No. 1553 ..Each $1.35

BROOM RAKE

Bamboo, Price $0.75

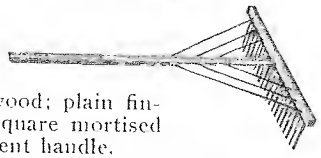
LAWN CLEANER



Designed to remove leaves and litter from shrubs and places difficult to get at with ordinary rake-teeth removable.

Price, each $1.00

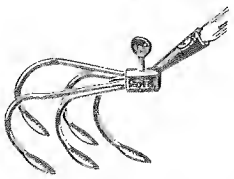
SAND TRAP RAKE



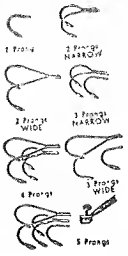
All hardwood; plain finish; teeth square mortised into head, bent handle.

Price $0.90 each $9.00 doz.

HAND CULTIVATORS



By a simple twist of the wing screw converted into seven different combinations.



GARDEX Interchangeable CULTIVATORS

No. 160 — For home garden. 5 prongs adjustable ¾ to 7 in., 4½ ft. handle $1.50

SPEEDY CULTIVATOR

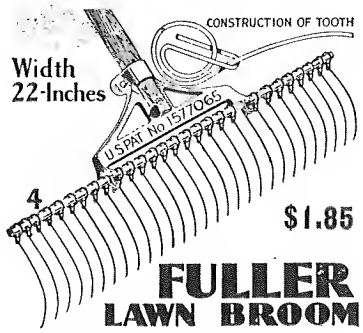
A time saver for preparing ground for seeding and cultivation of flowers and shrubs. Use an easy drawing stroke. 5 in. wide. Each

No. SC4—4½ ft. polished handle...$1.10

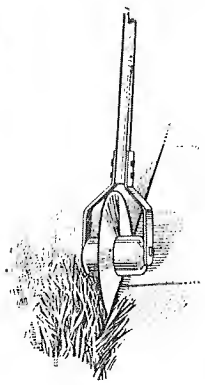
CULTI-CLAW

No. 180—For flower bed and rock gardens and ordinarily inaccessible places without stooping. 4½ ft. handle.

Each $1.00



PINES SOD EDGER



For opening up sod and for marking off sod before lifting.

Price $1.50

FLAT TOP

TRUE TEMPER TURF EDGERS

Flat Top	Each $1.00
Wing Top	Each 1.00

SOD LIFTER

Nine inch polished steel blade; 4 foot length over all.

Price $2.25

HOES

NEWMAN "EASY-KUT"

Extremely shallow blade with sharpened edge and sides. Will make a dust mulch and is a real weed killer. 4⅓ ft. handle.

No. NH7—7 in. blade .....Each $1.45

GARDEN HOE

No. XXX7—7 in. blade, 4½ ft. handle .....Each $1.25

NURSERYMEN'S HOE

Our most popular seller to the nursery trade. Strong socket with 4⅓ ft. straight grained handle. Holds a sharp edge.

No. 5—5 in. blade	Each $1.25
No. 6—6 in. blade	Each 1.25
No. 7—7 in. blade	Each 1.30
No. 8—8 in. blade	Each 1.35

No. BY6—Light weight, 6 in. blade, 4 ft. handle .....Each $1.20

FLORAL RAKE

No. TR6—6 tooth, 4 ft. handle..Ea. $0.75

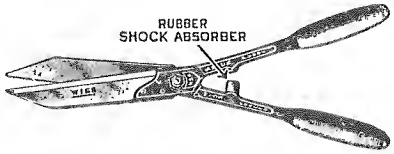
LOPPING SHEARS

20 in. Ash Handles

A popular pattern for cutting back shrubs and roses and vine pruning.

No. 120 ..... Each $2.75

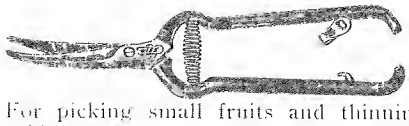
WISS ALL STEEL



One blade has a knife edge which cuts against a heavier serrated edge, gripping the twigs. Rubber shock-absorber and larger grips as illustrated. A well balanced shear for steady trimming.

	Each
8 in., wt. 3 lbs. 4 oz.	$3.25
9 in.	3.50
10 in., wt. 3 lbs. 8 oz.	3.75

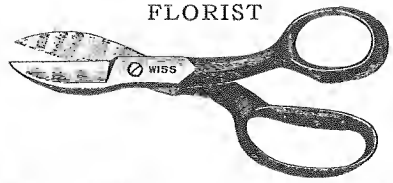
THINNING



For picking small fruits and thinning out blossoms.

No. C4—7½ in. ..... Each $1.25

FLORIST

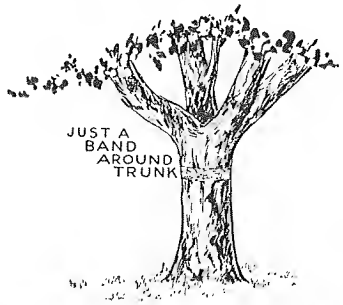


1¾ in. cut. Will cut wire and thin metal.

No. 402—7 in. ..... Each $1.40

TREE TANGLEFOOT

An Easier and Less Expensive Way to Protect Your Trees

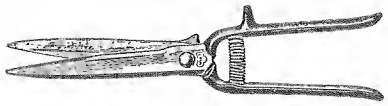


Banding them with TREE TANGLEFOOT is unfailing protection against Tussock Moth Caterpillars, Gypsy and Brown Tail Moth Caterpillars, Canker Worms, Climbing Cutworms, and other similar insect pests.

1-lb. tin	$ 0.70
5-lb. tin	3.25
10-lb. tin	6.25
25-lb. tin	12.75

GRASS SNIPS

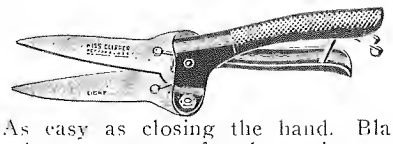
WISS



Narrow steel blades.

No. 5600—5½ in. ..... Each $1.35

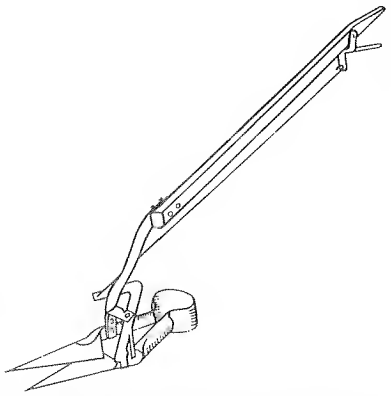
WISS-KLIP



As easy as closing the hand. Blades can be swung apart for sharpening.

No. 700 ..... Each $1.25

KLIP-EZY GRASS TRIMMER



Eliminates the back-breaking work in trimming grass around flower beds, bushes, and walks. Made of high grade steel—light in weight and sturdy in construction.

Price ..... Each $2.75

BLACK ANTISEPTIC TREE PAINT

This pruning compound of Egyptian Asphalt base contains only the proper ingredients for the healing of tree wounds after pruning. Will not wash off, crack or blister. Thin only with raw linseed oil.

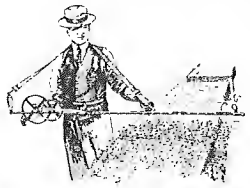
	Liquid	Plastic
1 qt. can	$ 0.75	$0.90
1 gal. can	1.50	1.75
5 gal. drum	5.50	7.50
30 gal. drum	30.00	....

BALSAM WOOL TREE BANDING

Packed 12 rolls or 200 lineal feet to log.

Price ..... Per log $2.50

LITTLE WONDER HEDGE TRIMMER



Cuts every variety of hedge grown 5 to 10 times as fast as by hand. Comes complete with various attachments for every manner of operation. Full information on request.

Hand Models

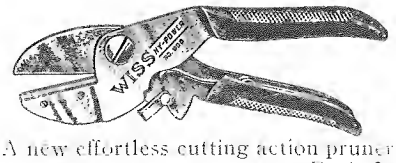
30 in. size	$25.00
40 in. size	27.50
60 in. size	35.00
Side Cutting Carriage, optional	4.50

Electric Models

27 in. Junior	$ 59.50
36 in. Senior	99.50
60 in. Senior	104.50

With 115 ft. of wire and reel.

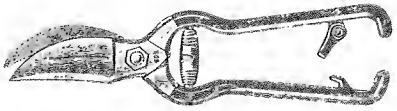
PRUNERS



A new effortless cutting action pruner.

No. 908 ..... Each $2.00

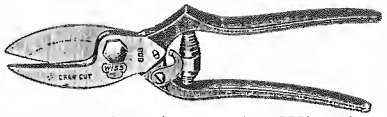
WISS



A high quality solid steel pruner with beveled blade and nicely rounded handles.

No. 609—9 in. ..... Each $1.50

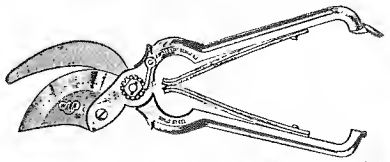
DRAW CUT



The new favorite in the Wiss family. The cutting edge of blade is longer than the hook, giving a drawing action; branches cannot slip out, and the capacity for its size is amazing. Open end handles prevent pinching the palm of hand.

No. 808—8 in. ..... Each $2.00

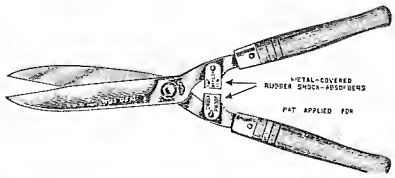
NURSERYMEN'S



The finest product of Wiss for heavy duty nursery and orchard use. Double leaf springs of phosphor bronze and strong polished frame. Interchangeable parts.

No. 109B—9 in. ..... Each $3.25

ENGLISH PATTERN



8½ in.	Each	$3.30
9½ in.	Each	3.65
10½ in.	Each	4.00

MILCOR STEEL COMPANY

SOLID PLASTER PARTITIONS AND FURRED WALLS

1. All plastered partitions and furred walls, except where hollow stud partitions are used, shall be constructed of one line of 3/4 inch cold rolled channels spaced not less than 12 inches center to center with top and bottom members of steel, all members to be painted.

2. The ceiling runner shall consist of a 20 Gauge 3/4 inch by 2 inch steel angle, long leg down, with counter-sunk perforations on the long leg and slotted holes for nailing on the short leg, and (except where metal base is used, see specifications pp.____ to _____) an 18 Gauge steel floor runner, with crimps occurring every 1 inch and with flat spaces 1 inch long every 12 inches containing a slotted hole for attaching to floor, correctly aligned to receive studs. Both ceiling and floor runners to be secured to ceiling and floor respectively, at 2 feet center to center.

3. The studs shall be slotted at one end and the leg of the ceiling runner shall be engaged in the slot and the bottom end of the stud dropped into the "V" of the floor runner.

4. Where piping or conduit work interferes with the horizontal runners, such runners may be cut or omitted at such points, but the stud ends shall be adequately secured to the floors and ceilings.

5. Studs shall be so placed and of such number as to provide solid backing at all closets. Studs adjacent to metal door frames and at ends of stud partitions shall be doubled, back to back and bolted to and be placed so as to engage the brackets furnished with the door bucks and be securely wired thereto. Studding shall be so placed where metal grounds are specified herein so as to provide sufficient and proper support for the grounds. Partition framing shall be accurately located, set to the required dimensions, properly aligned, made plumb and true.

6. Above each opening provide one 1/4" Pencil Rod on the side of studding opposite to that on which lath is applied. The bar shall be placed 6 inches above the top of the opening and shall extend across the first single stud beyond the double studs at the sides of the opening and be securely wired to each stud. Where transoms are indicated the above described bar will not be required.

7. NOTE: The Contractor shall have the option of using any other type of, or construction for, plastered partitions of two inch thickness which satisfactorily pass tests acceptable to the Authority. Such partitions shall develop resistance to cracks caused by slamming doors and strength, rigidity and resistance to fire equal to the solid partition specified. The finish and all other applicable requirements shall be as specified for solid plaster partitions.

METAL PARTITION ENDS

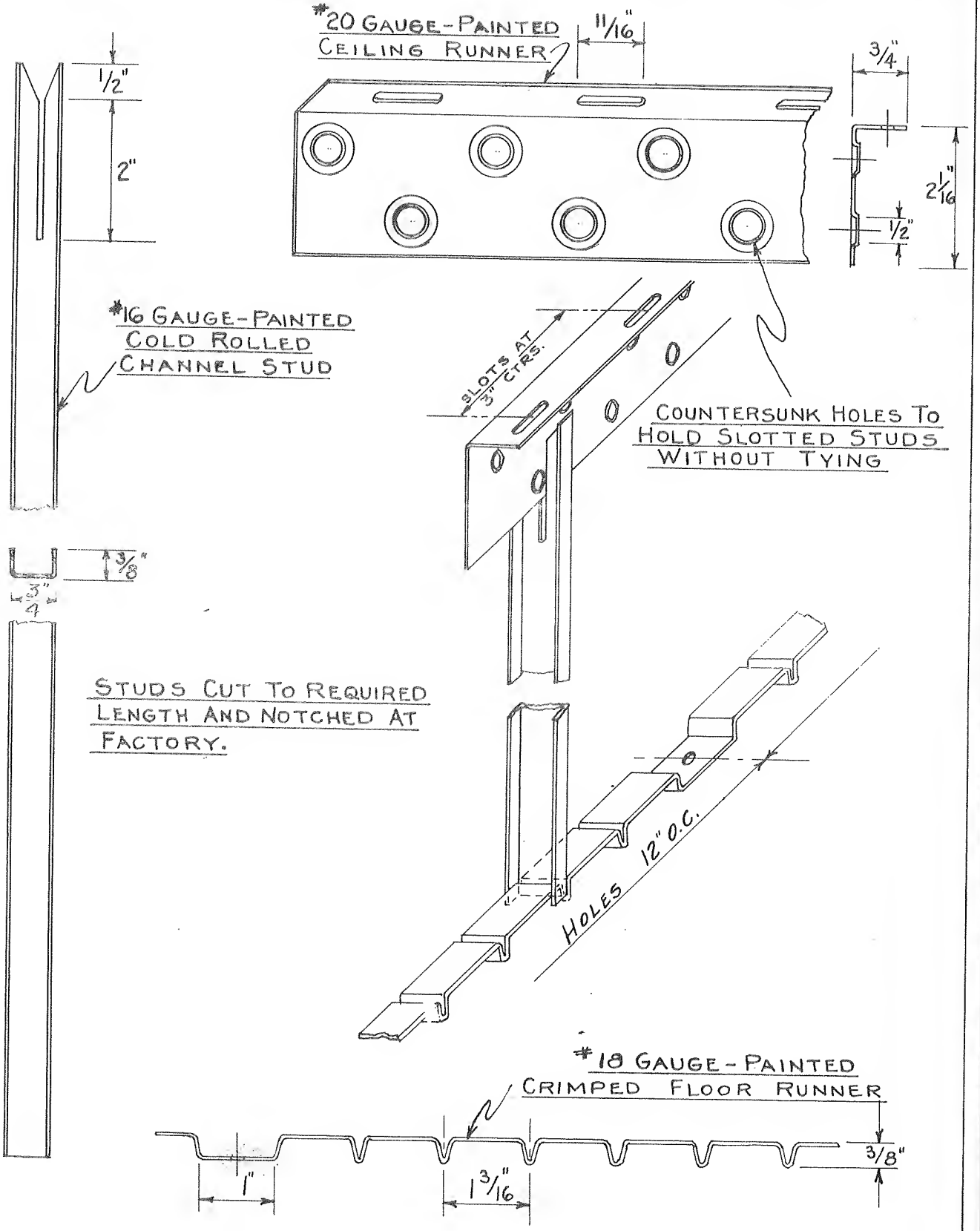
1. Provide 16 Gauge Galvanized Expansion Wing 1-1/2" radius 2" wide face Bull Nose Partition Ends, similar to Milcor No. 20, for all jambs at kitchen openings, closets without doors, and stair rails at free ends of 2 inch plaster partitions, and at dwarf partitions.

LATHING

1. Metal Lath for 2" Plaster Partitions and furred walls shall be Milcor 2.5# Ptd. Netmesh Diamond Metal Lath. Lathing shall be placed with long dimension at right angles to bearings and studs. The end and edges of sheets shall be lapped not less than 1 inch. End Joints shall be at bearings only and staggered. Lath shall be fastened at not more than 7 inch intervals along supports, and side joints shall be wired once between supports. For 2 inch solid partition and free standing metal wall furring, the edge of the top sheet of lath adjacent to the ceiling runner, shall be wired to the runner at each midway point between the studs, and one tie shall also be made at each stud at the point where stud engages the ceiling runner; this tie to engage stud, lath and ceiling runner. At the floor the lath shall be carried below top of metal base. Lath abutting masonry surfaces that are to be plastered shall extend on to same not less than 6 inches. Lath applied over masonry and concrete surfaces shall be fastened thereto (without furring) at not more than 6 inch intervals. All fastenings shall be zinc-coated. Lacing wire shall be Galvanized and not less than No. 18 Gauge (0.048) except as otherwise specified.

2. Lath shall be continuous around the corners of intersecting surfaces. Chases and other openings in masonry walls which are to be plastered shall be covered with lath extending not less than 6 inches beyond the edges of the openings and fastened directly to the walls (without furring) at not more than 6 inch intervals.

3. Where plastered partitions abut concrete columns, beams or girders, so that the faces of the partitions and concrete are approximately in the same plane, cover with lath (without furring) and securely fasten to concrete every 6 inches as described hereinbefore.

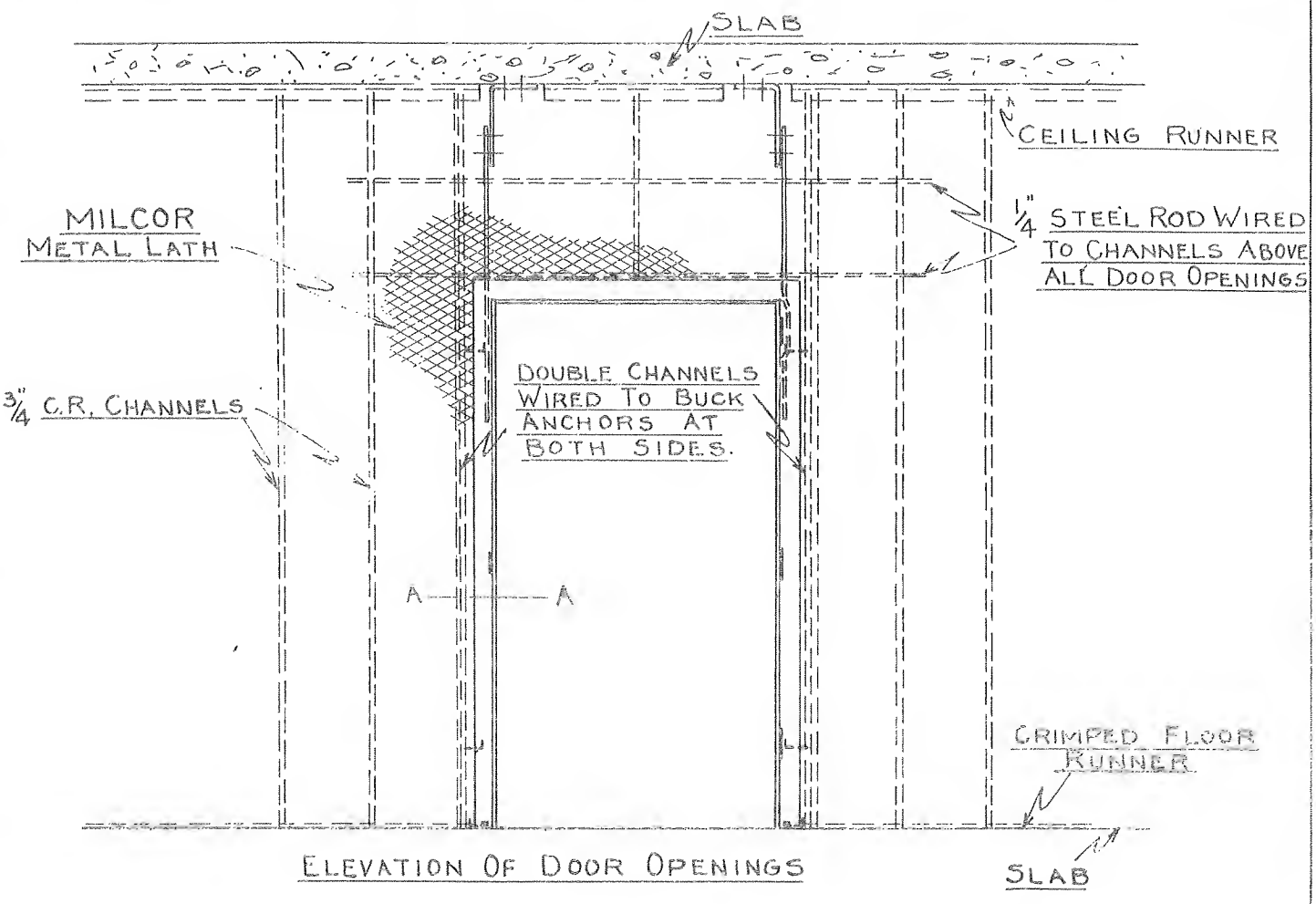


UNITS OF MILCOR 2 INCH SOLID PARTITION AND FURRING SYSTEM.

STANDARD DETAIL
Nº 21

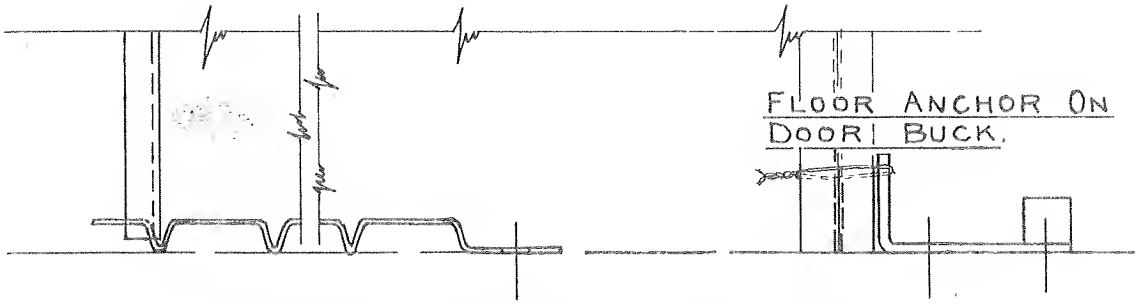
MILCOR STEEL CO.
MILWAUKEE, WIS.

REVISED: 7-1-1940



ELEVATION OF DOOR OPENINGS

SECTION A-A



SECTION AT BOTTOM OF DOOR BUCK

DOOR FRAMING DETAILS FOR MILCOR 2 INCH SOLID PARTITION SYSTEM.

STANDARD DETAIL No. 22

MILCOR STEEL CO. MILWAUKEE, WIS.

REVISED 7-1-1940

MILCOR STEEL COMPANY

SUGGESTED SPECIFICATIONS FOR MILCOR
NOS. 681, 683, and 684 TYPES OF METAL BASE

A. The metal base shall be of the flush type, 3 inches in height and formed from one piece of 20 gauge Titecoat Galvanized Steel for all parts, unless otherwise called for hereinafter. The metal base shall be of the design as indicated on the drawings.
(NOTE: These bases are also available in 18 and 16 Gauge weights.)

B. The metal base for the 2" Partitions shall be similar to Milcor No. 684 formed in one piece consisting of two sides forming the face of the base, exactly 2" apart, with an integral bottom raised and perforated to receive the lower end of the channel studs. This complete unit shall act as a base trim for the two sides of the partition, as a ground for the plaster, and as a floor member for retaining the bottom ends of the studs. There shall be a 14 gauge concealed splice plate at every joint to insure proper alignment. The base shall be fastened to the concrete by means of concrete stub nails, spaced not more than 24" on center and the upper edges of the metal base shall be fastened together with spacer or saddle clips to maintain the true 2" exterior alignment of the two sides of the metal base.

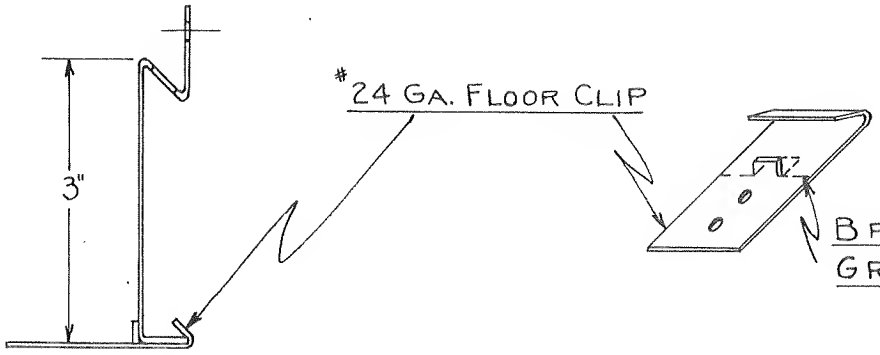
C. The metal base for the exterior furred walls and for the interior partitions where the partitions are plastered on one side only, shall be similar to Milcor No. 683, formed substantially as described for the 2 inch solid plaster partitions, but eliminating the one face of the metal base. 20 Gauge concealed splice plates shall be used at every joint.

D. The metal base for the masonry walls shall be similar to Milcor No. 681, of one face only and shall not contain the raised floor portion to receive studs. 20 Gauge concealed splice plates shall be used at every joint.

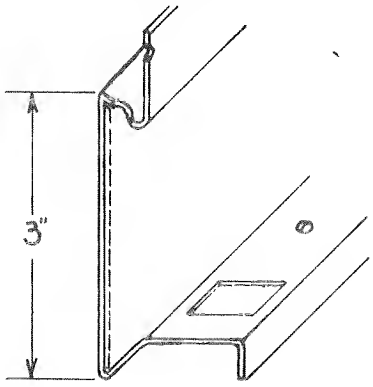
E. All metal base shall be primed on both sides with one coat of gray rust inhibitive primer.

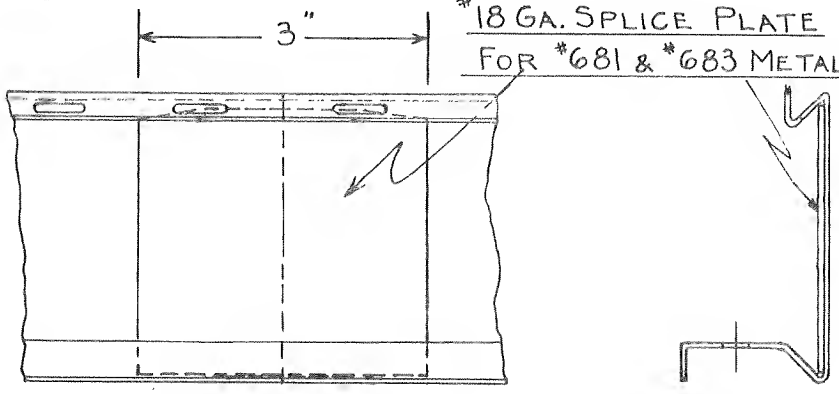
F. Corner fittings for the metal base shall be prefabricated by the manufacturer and wherever possible, the legs of the fittings shall be no less than 8 inches in length. At the contractors option and with the approval of the architect, the internal corners may be butted and wired.

G. After the metal base is set in place and the channel studs erected, the base shall be grouted with a thin cement fill.

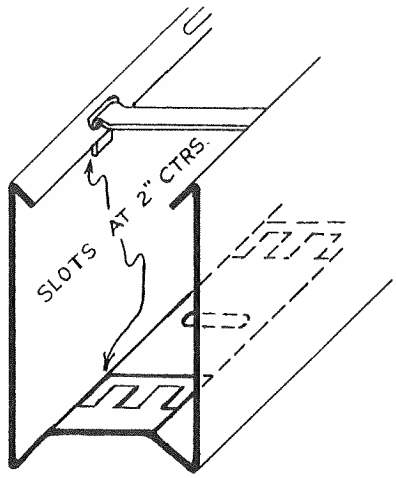


*681 METAL BASE
FOR MASONRY WALLS

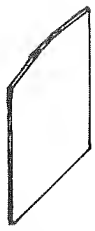




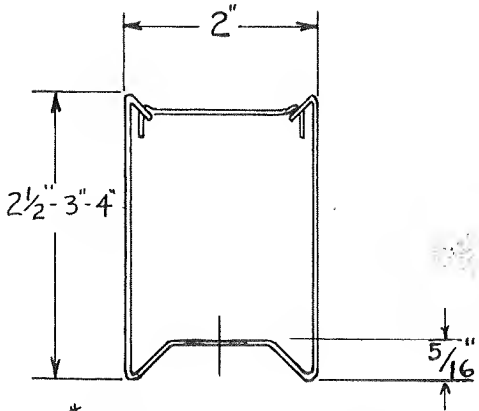
*683 METAL BASE
FOR FURRED WALLS



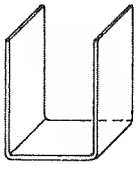
ISOMETRIC



SPLICE PLATE
FOR 681 & 683 BASE.
CAN ALSO BE USED
FOR *684 BASE.



*684 METAL BASE
FOR SOLID PARTITIONS



"U" TYPE SPLICE PLATE
FOR *684 METAL BASE

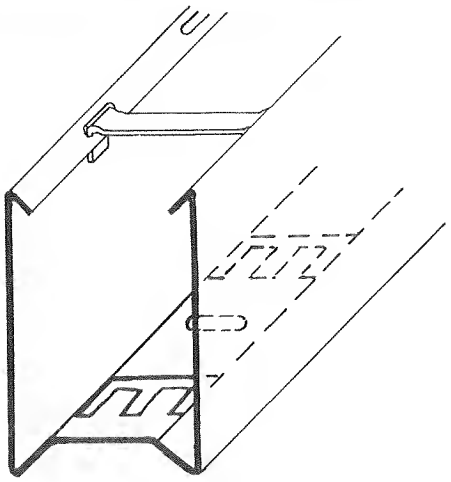
BASES Nº 681, 683 & 684 AVAILABLE IN 16, 18, & 20 GA

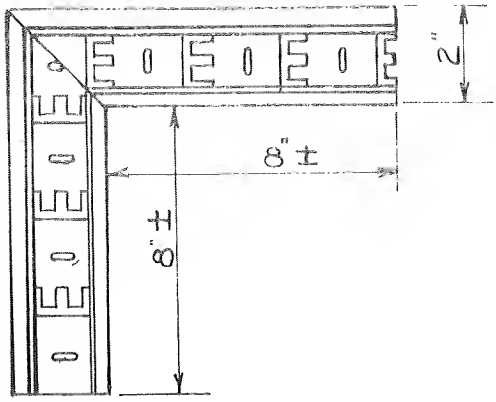
MILCOR METAL BASE – FOR MASTIC OR COMPOSITION FLOORS.

STANDARD DETAIL
Nº 26

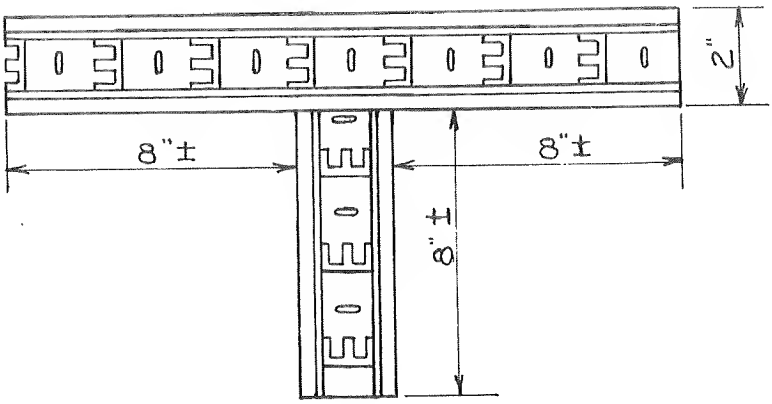
MILCOR STEEL CO.
MILWAUKEE, WIS.

REVISED: 1-9-41

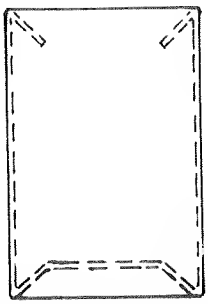




TOP VIEW OF
MITERED & WELDED CORNERS



TOP VIEW OF
WELDED "T" SECTION



END CLOSURE WELDED IN PLACE

SERIES *661 SIMILAR EXCEPT COVE TO BE JOB MITERED AND FITTED AT THE CORNERS.

CORNER FITTINGS AND END CLOSURE FOR MILCOR METAL BASE - *664 & *684.	STANDARD DETAIL Nº 27
	MILCOR STEEL CO. MILWAUKEE, WIS.

REVISED: 1-9-41

MILCOR STEEL COMPANY

SUGGESTED SPECIFICATIONS FOR MILCOR
NOS. 661, 663 and 664 TYPES OF METAL BASE

A. The metal base shall be of the flush type, 3 inches in height formed from one piece with a quarter round clip-on shoe mould. The metal base shall be of the design as indicated on the drawings, fabricated from 20 Gauge Titecoat Galvanized Steel for all parts, unless otherwise called for hereinafter. (NOTE: These bases are also available in 18 and 16 Gauge weights but the shoe mould is made in 20 Gauge only.)

B. The metal base for the 2" Partitions shall be similar to Milcor No. 664 formed in one piece consisting of two sides forming the face of the base, exactly 2" apart, with an integral bottom raised and perforated to receive the lower end of the channel studs. This complete unit shall act as a base trim for the two sides of the partition, as a ground for the plaster, and as a floor member for retaining the bottom ends of the studs. There shall be a 14 gauge concealed splice plate at every joint to insure proper alignment. The base shall be fastened to the concrete by means of concrete stub nails spaced not more than 24" on center and the upper edges of the metal base shall be fastened together with spacer or saddle clips to maintain the true 2" exterior alignment of the two sides of the metal base

Crimped clips shall be welded to the sides of the base every 18 inches as fastenings for the shoe mould. The shoe mould shall be of the design indicated in the drawings.

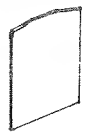
C. The metal base for the exterior furred walls and for the interior partitions where the partitions are plastered on one side only, shall be similar to Milcor No. 663, formed substantially as described for the 2 inch solid plaster partitions, but eliminating the one face of the metal base. 20 Gauge concealed splice plates shall be used at every joint.

D. The metal base for the masonry walls shall be similar to Milcor No. 661, of one face only and shall not contain the raised floor portion to receive studs. 20 Gauge concealed splice plates shall be used at every joint.

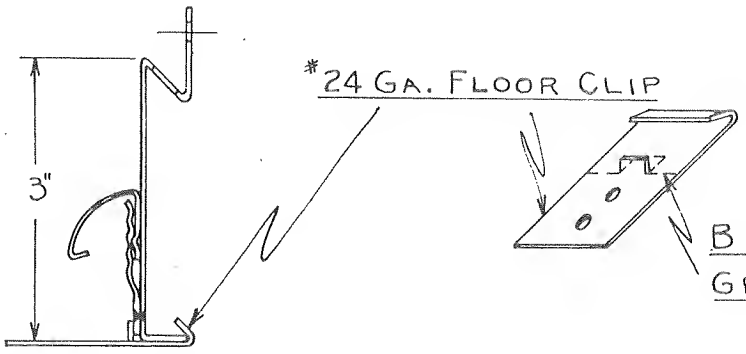
E. All metal base shall be primed on both sides with one coat of gray rust inhibitive primer.

F. Corner fittings for the metal base shall be prefabricated by the manufacturer and wherever possible, the legs of the fittings shall be no less than 8 inches in length. At the contractors option and with the approval of the architect, the internal corners may be butted. Corner fittings for the cove mould shall be shop fabricated for the exterior corners. The interior cove corners shall be mitred or coped at the job. Where required, end closures for cove mould shall be shop fabricated.

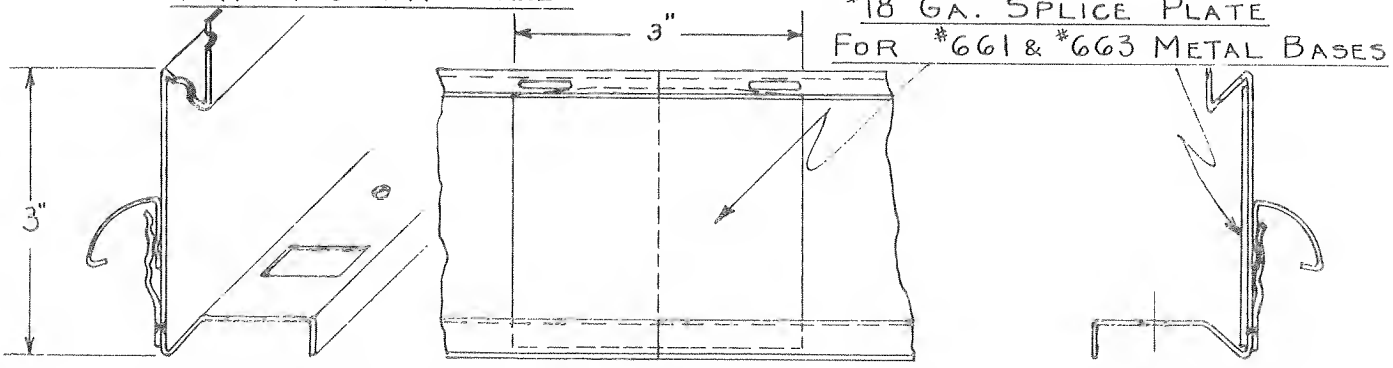
G. After the metal base is set in place and the channel studs erected the base shall be grouted with a thin cement fill.



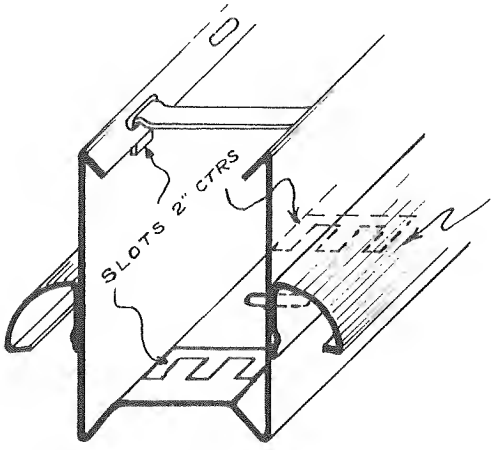
SPLICE PLATE
BASE 661 & 663
18 GA.



*661 METAL BASE
FOR MASONRY WALLS

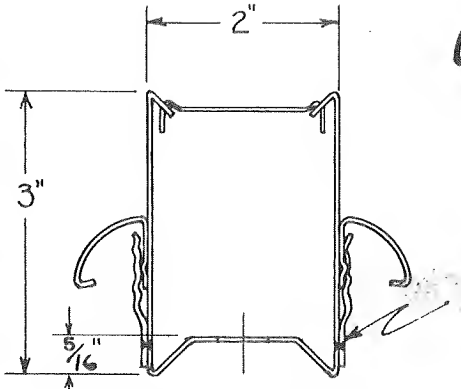


*663 METAL BASE
FOR FURRED WALLS



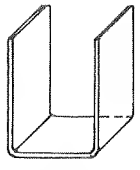
CLIP ON MOULD AFTER
WOOD FLOOR IS ON

ISOMETRIC



2 INCH WIDE CLIPS
WELDED 18" O.C.

*664 METAL BASE
FOR SOLID PARTITIONS



*"U" TYPE SPLICE PLATE
FOR *664 METAL BASE

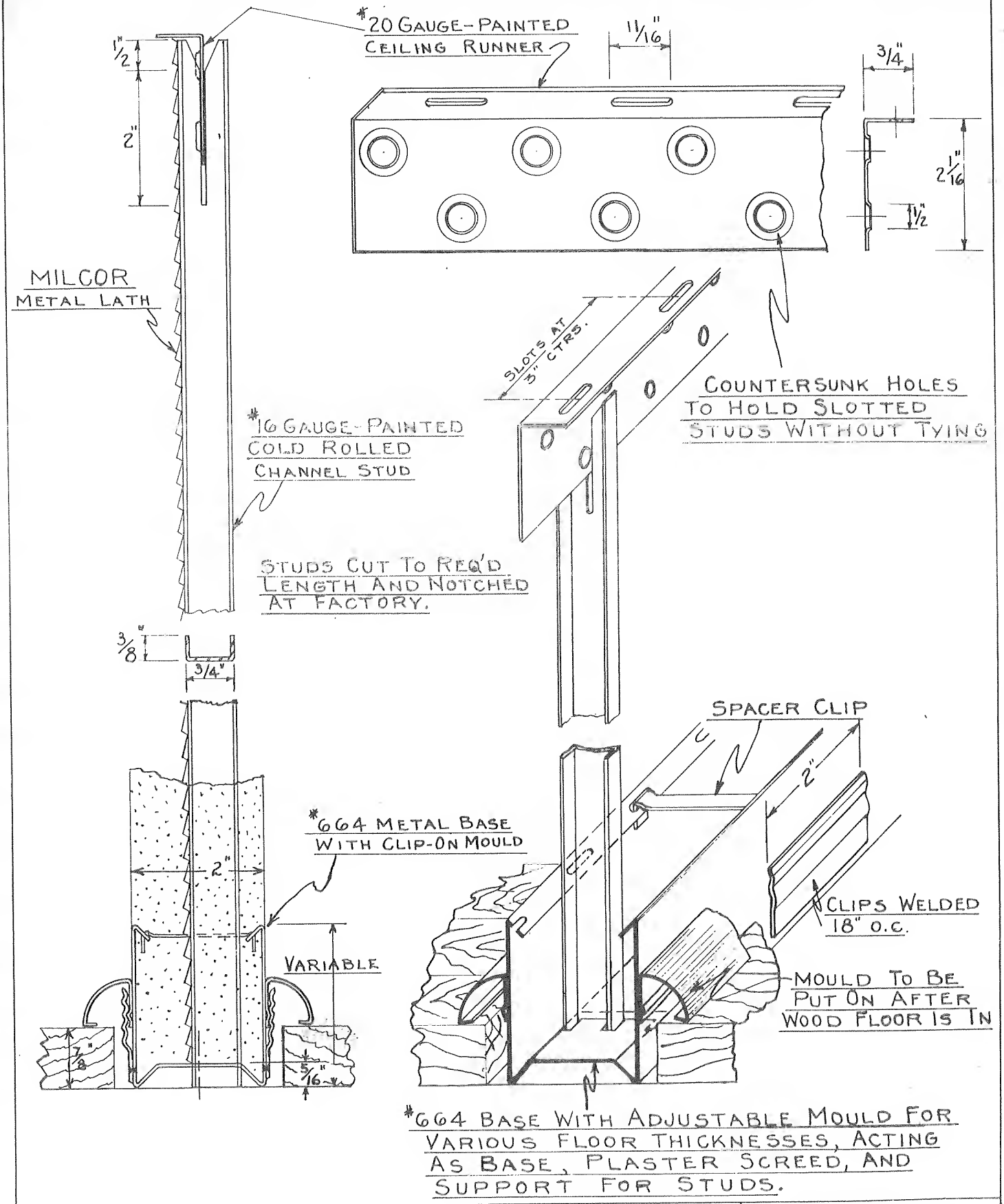
BASE 661, 663 & 664 AVAILABLE IN 16, 18 OR 20 GA.

MILCOR METAL BASE — FOR USE WITH WOOD FLOORS.

STANDARD DETAIL
Nº 28

MILCOR STEEL CO.
MILWAUKEE, WIS.

REVISED: 1-9-41



MILCOR 2 INCH SOLID PARTITION SYSTEM WITH *664 METAL BASE. FOR USE WITH WOOD FLOORS.

STANDARD DETAIL Nº 29

MILCOR STEEL CO. MILWAUKEE, WIS.

REVISED: 1-9-41

MILCOR STEEL COMPANY

SUGGESTED SPECIFICATIONS FOR MILCOR
NOS. 691, 693 and 694 TYPES OF METAL BASES

A. The metal base shall be of the flush type with cove, 3 inches in height and formed from one piece of 20 Gauge Titecoat Galvanized Steel for all parts, unless otherwise called for hereinafter. The metal base shall be of the design as indicated on the drawings. (NOTE: These bases are also available in 18 and 16 gauge weights.)

B. The metal base for the 2" partitions shall be similar to Milcor No. 694 formed in one piece consisting of two sides forming the face and cove of the base, with an integral bottom raised and perforated to receive the lower end of the channel studs. This complete unit shall act as a base trim for the two sides of the partition, as a ground for the plaster, and as a floor member for retaining the bottom ends of the studs. There shall be a 14 Gauge concealed splice plate at every joint to insure proper alignment. The base shall fastened to the concrete by means of concrete stub nails, spaced not more than 24" on center and the upper edges of the metal base shall be fastened together with spacer or saddle clips to maintain the true 2 inch exterior alignment of the two sides of the metal base.

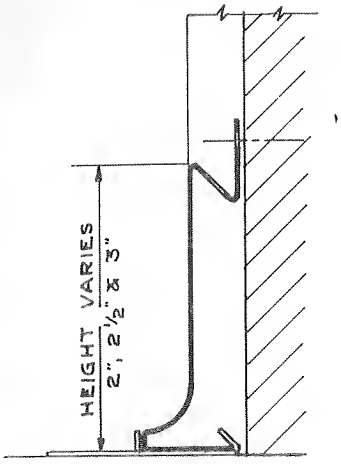
C. The metal base for the exterior furred walls and for the interior partitions where the partitions are plastered on one side only, shall be similar to Milcor No. 693, formed substantially as described for the 2 inch solid plaster partitions, but eliminating the one face of the metal base. 20 Gauge concealed splice plates shall be used at every joint.

D. The metal base for the masonry walls shall be similar to Milcor No. 691 of one face only and shall not contain the raised floor portion to receive studs. 20 Gauge concealed splice plates shall be used at every joint.

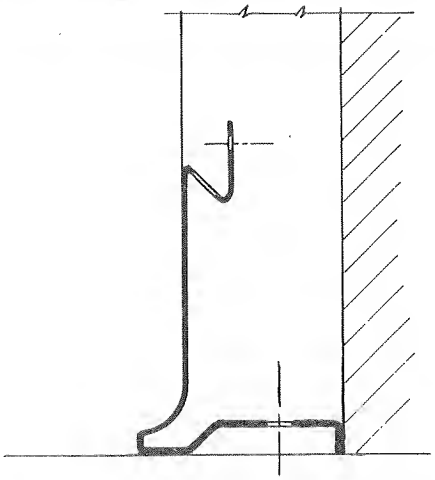
E. All metal base shall be primed on both sides with one coat of gray rust inhibitive primer.

F. Corner fittings for the metal base shall be prefabricated by the manufacturer and wherever possible, the legs of the fittings shall be no less than 8 inches in length.

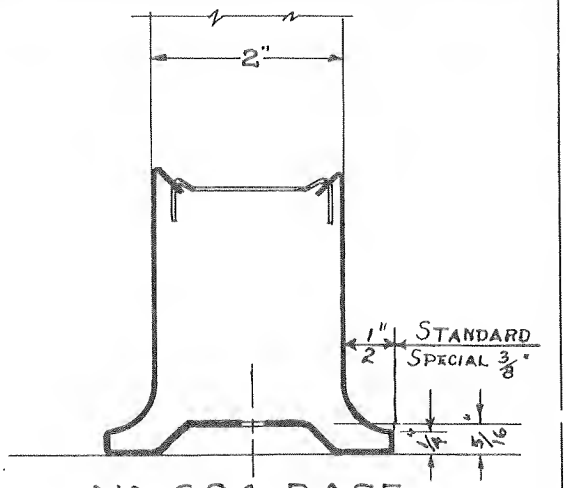
G. After the metal base is set in place and the channel studs erected, the base shall be grouted with a thin cement fill.



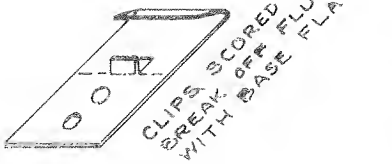
№ 691 BASE
AT MASONRY WALLS.



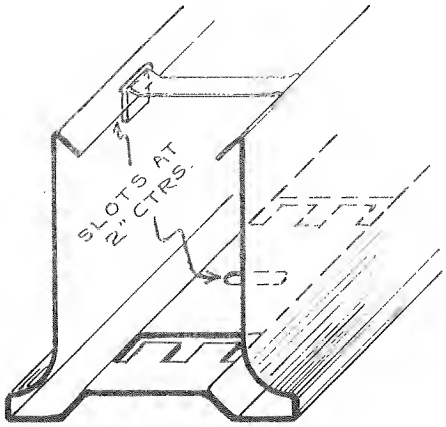
№ 693 BASE
AT FURRED WALLS.

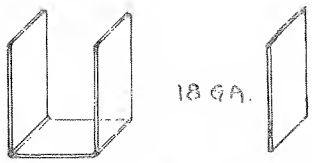


№ 694 BASE
AT 2" SOLID PARTITIONS.



FLOOR CLIP
24 GA.

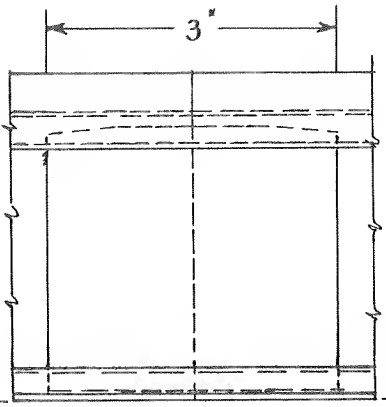


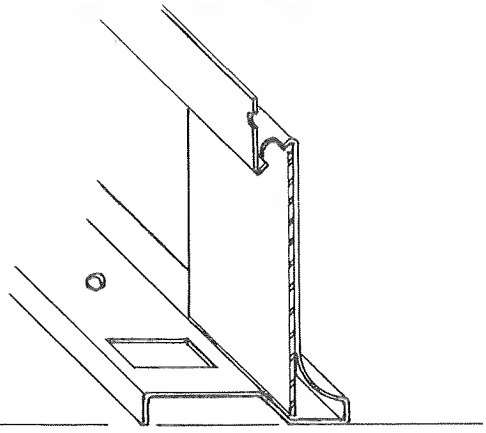


SPLICE PLATES

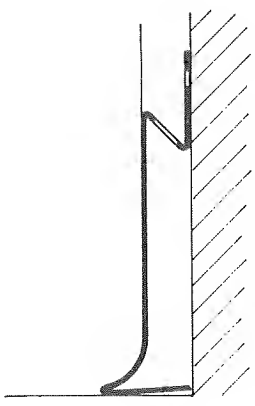
TYPE 'U'
BASE 694

TYPE 'I'
BASE 691-693.
CAN ALSO BE
USED FOR #694





ELEVATION. SECTION
SHOWING 'L' TYPE SPLICE PLATE IN
POSITION AT BUTT JOINT 693 BASE.



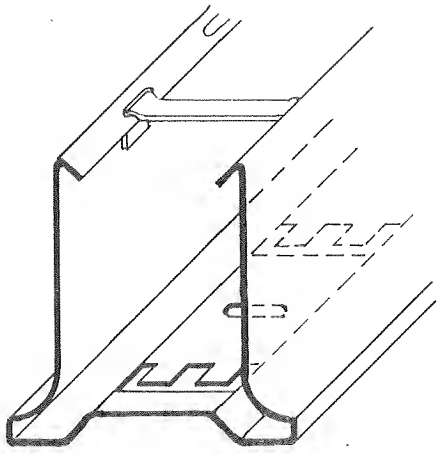
ALTERNATE DETAIL
SHOWING TOE OF BASE
HEMMED. THIS STYLE
AVAILABLE FOR BASE
TYPES 691, 693 & 694.

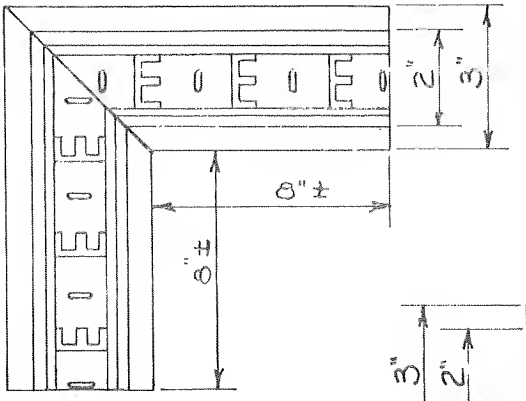
MILCOR METAL BASE - FOR USE WITH LINOLEUM FLOORS.

STANDARD DETAIL
№ 30

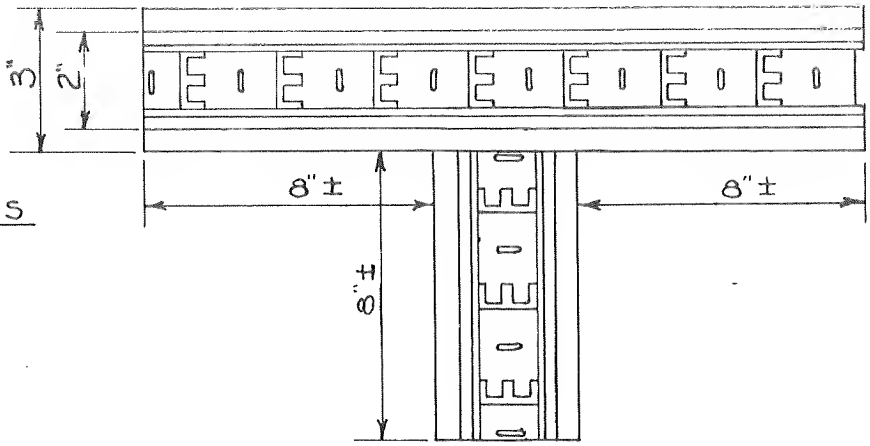
MILCOR STEEL CO.
MILWAUKEE, WIS.

REVISED: 1-9-41

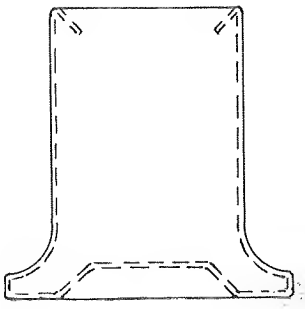




TOP VIEW OF
MITRED & WELDED CORNERS



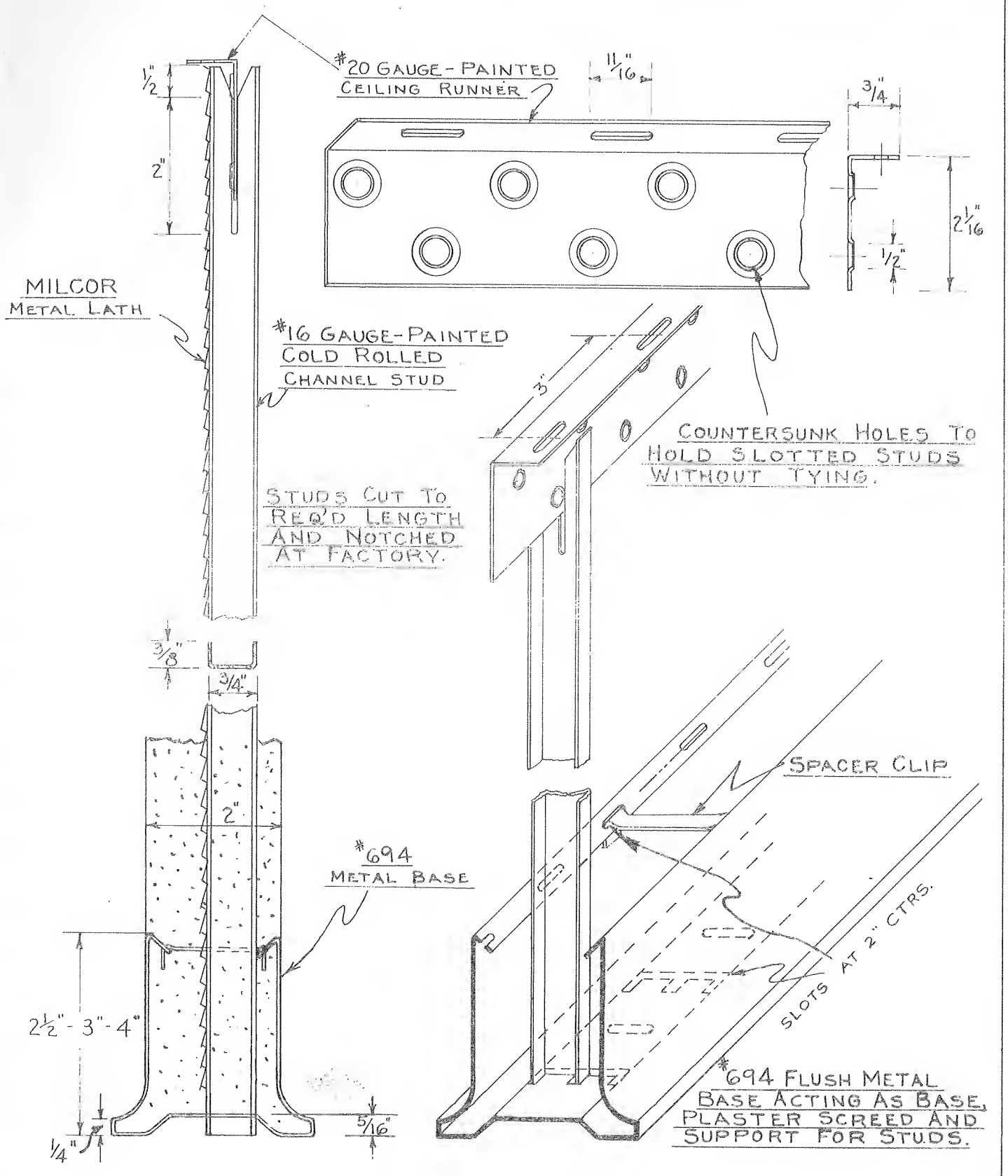
TOP VIEW OF
WELDED "T" SECTION



END CLOSURE WELDED IN PLACE

CORNER FITTINGS AND END CLOSURE FOR MILCOR METAL BASE #694.	STANDARD DETAIL N° 31
	MILCOR STEEL CO. MILWAUKEE, WIS.

REVISED: 1-9-41

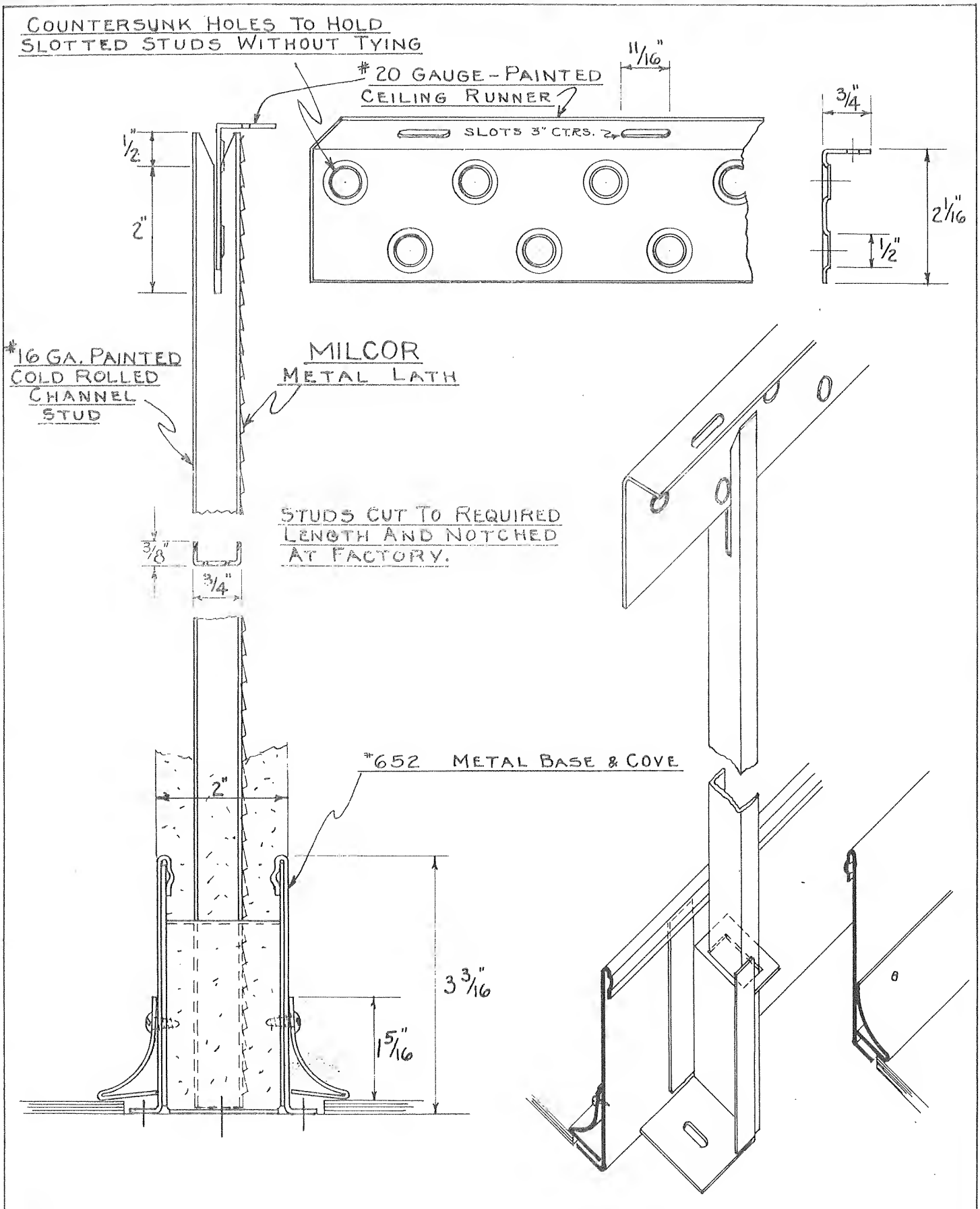


MILCOR 2 INCH SOLID PARTITION SYSTEM WITH #694 METAL BASE. FOR USE WITH LINOLEUM FLOORS.

STANDARD DETAIL
No. 32

MILCOR STEEL CO.
MILWAUKEE, WIS.

REVISED: 1-9-41

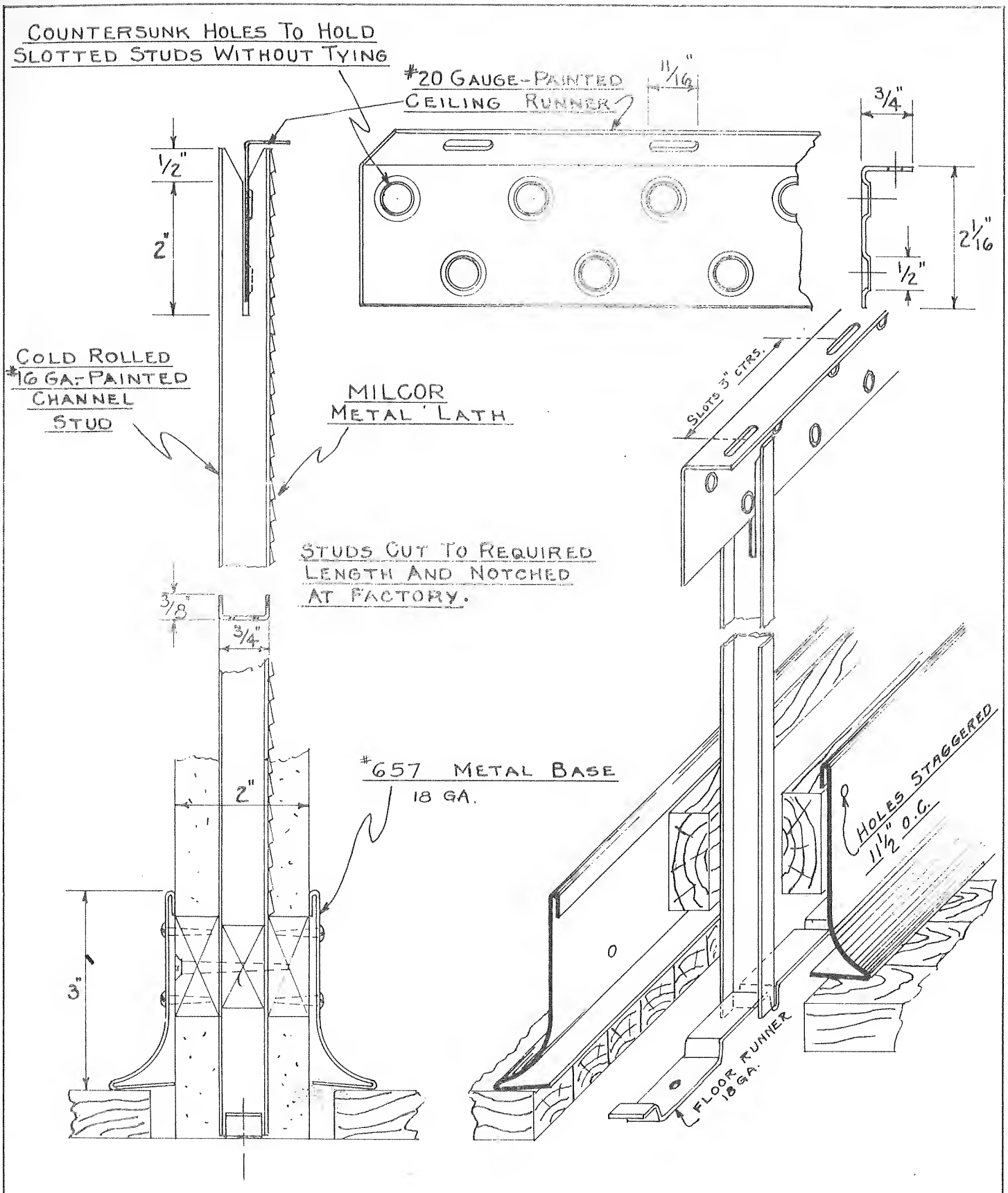


MILCOR 2 INCH SOLID PARTITION SYSTEM WITH #652 METAL BASE.

STANDARD DETAIL
No. 33

MILCOR STEEL CO.
MILWAUKEE, WIS.

REVISED: 7-1-1940

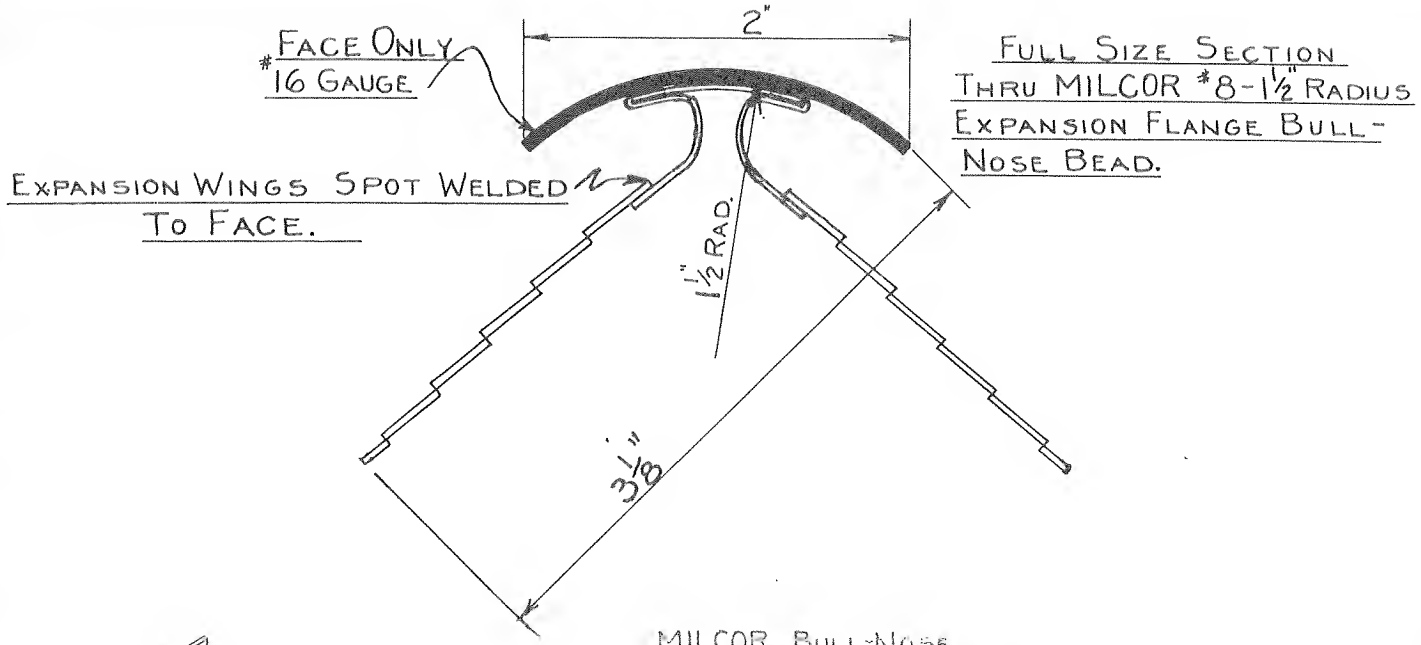


MILCOR 2 INCH SOLID PARTITION SYSTEM WITH *657 METAL BASE.

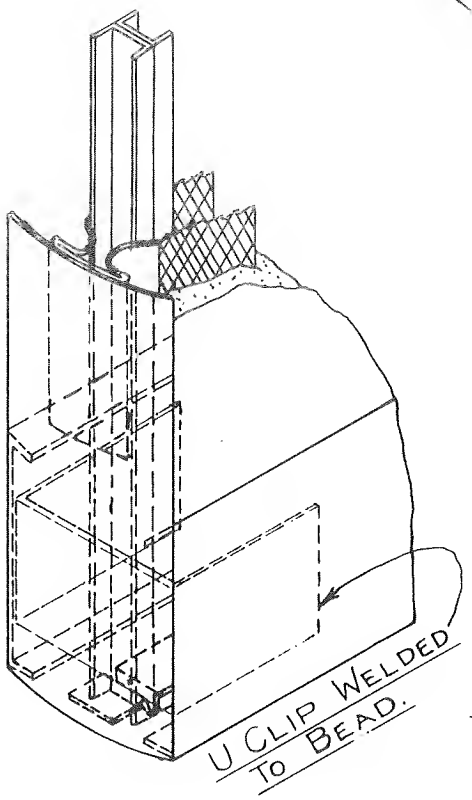
STANDARD DETAIL Nº 34

MILCOR STEEL CO. MILWAUKEE, WIS.

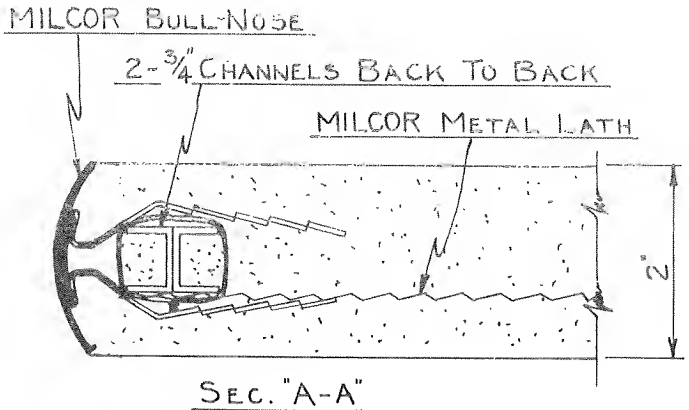
REVISED: 7-1-1940



FULL SIZE SECTION THRU MILCOR #8-1½" RADIUS EXPANSION FLANGE BULL-NOSE BEAD.

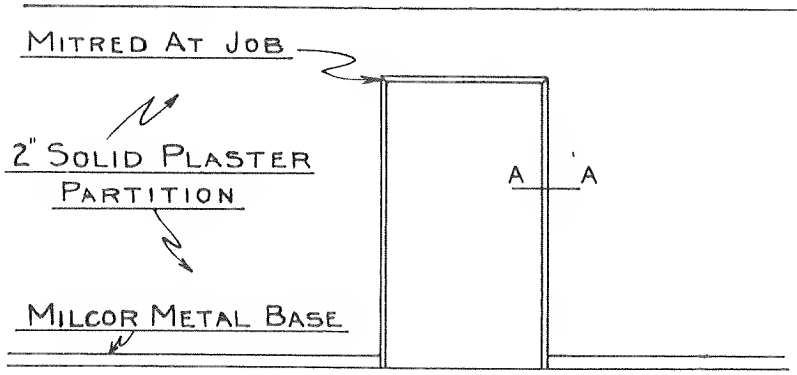


ISOMETRIC

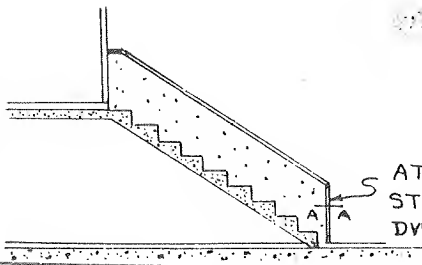


SEC. "A-A"

CROSS-SECTION OF WALL AT CASED OPENING.



ELEVATION OF CASED OPENING



AT 2" PLASTER STAIR RAIL, OR AT DWARF PARTITIONS.

MILCOR #8 EXPANSION BULL NOSE BEAD FOR USE WITH CASED OPENINGS.

STANDARD DETAIL N° 35

MILCOR STEEL CO. MILWAUKEE, WIS.

REVISED: 7-1-1940

MILCOR STEEL COMPANY

SUGGESTED SPECIFICATIONS FOR MILCOR NO. 667 METAL BASE

A. Metal base shall be provided throughout the dwelling units where plastered walls occur. See details and plans for extent and location of metal base.

B. The base shall be of the flush type similar to Milcor's No. 667 base 3" high formed from Titecoat Galvanized 18 Gauge, (or 20 Gauge) Steel, painted both sides after fabrication with one coat of gray rust inhibitive primer. The clips shall be formed from 18 Gauge Galvanized Titecoat Steel not painted. Splice plates shall be formed from 20 Gauge Galvanized Titecoated Steel, not painted.

C. The metal base for masonry walls shall be fastened by means of a flange clip inserted in both the top and bottom flanges of the metal base so that the base will be held in positive alignment at both its upper and lower edge. The clips shall be nailed to the masonry wall.

D. Metal base for interior lath partitions where the partition is plastered on one side only or for furred walls shall be fastened by means of a furring clip of the design shown on the details, which furring clip shall act as a retaining member for the metal base and shall also serve as a holder for the channel studs. These clips shall be nailed to the floor at intervals (of not more than 12" centers,) equal to the spacing of the channel studs.

E. Metal base for the 2" Solid Partitions shall be installed as a unit consisting of two sides of the metal base held in alignment by clips of the design indicated on the plans, engaging both the upper and lower flanges of the metal base. The clips shall also serve as a holder for the channel studs and shall be used at intervals equal to the spacing of the channel studs.

F. Splice plates shall be used at all joints to insure proper alignment of the adjoining sections of metal base.

G. After the metal base is set in place and the channel studs erected, the base shall be grouted with a thin cement fill.

H. Corners shall be fabricated at the plant and wherever possible the legs shall be not less than 8" long, or at the contractors option and with the approval of the architect, the corners may be fabricated at the job with tools furnished by the contractor for the purpose.

MILCOR STEEL COMPANY

SUGGESTED SPECIFICATIONS FOR COMBINATION
OF MILCOR NO. 667 AND NO. 684 METAL BASES

A. Metal Base shall be provided throughout the dwelling units where plastered walls occur. See details and plans for extent and location of metal base.

B. The base shall be of the flush type, 3" high, formed from 18 Gauge (or 16 or 20 Gauge) Titecoat Galvanized Steel, painted both sides after fabrication, with one coat of Gray Rust Inhibitive Primer.

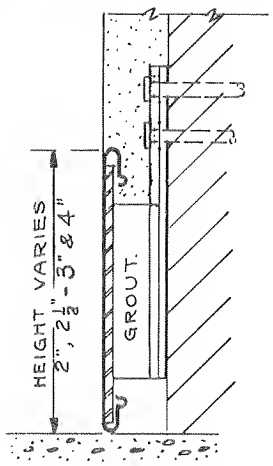
C. The metal base for masonry walls shall be Milcor No. 667 fastened by means of a clip engaging both the top and bottom flanges of the metal base so that it will be held in positive alignment at both the upper and lower edges. The clips shall be nailed to the masonry wall. Splice plates shall be formed from 20 Gauge Galvanized Titecoat Steel, not painted, and clips shall be formed from 18 Gauge Galvanized Titecoat Steel, not painted.

D. Metal Base for interior lath partitions where the partition is plastered on one side only, or for furred walls, shall be Milcor No. 667 Metal Base attached by means of a furring clip of the design shown in the details. This furring clip shall act as a retainer member for the metal base and will also serve as a holder for the channel stud. The clips shall be nailed to the floor at intervals equal to the spacing of the channel studs. Splice plates shall be formed from 20 Gauge Galvanized Steel, not painted, and clips shall be formed of 18 Gauge Galvanized Steel, not painted.

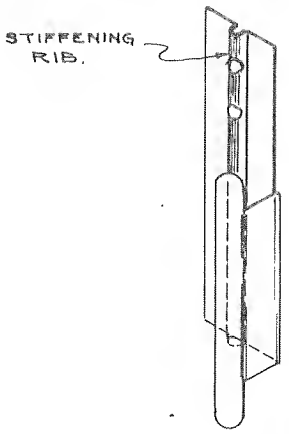
E. Metal Base for the 2" Partitions shall be similar to Milcor No. 684, formed in one piece, consisting of two sides forming the face of the base, exactly two inches apart, with an integral bottom raised and perforated to receive the lower end of the channel studs. This complete unit shall act as a base trim for the two sides of the partition, as a ground for the plaster, and as a floor member for retaining the bottom ends of the studs. There shall be 14 Gauge Steel Splice Plates at every joint to insure proper alignment. The base shall be fastened to the concrete by means of concrete stub nails, spaced not more than 24 inches on center, and the up ridge of the metal base shall be fastened together with spacer or saddle clips to maintain the true 2" exterior alignment of the two sides of the metal base.

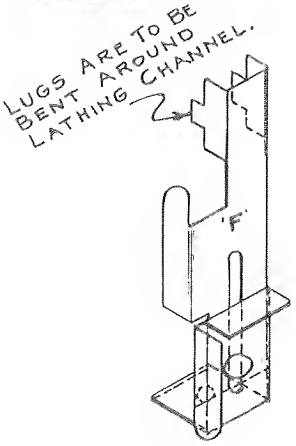
F. The corner fittings for the No. 684 Partition Base shall be prefabricated by the manufacturer, and wherever possible the legs of the fittings shall be no less than 8 inches in length. The fittings for the No. 667 type of Metal Base at the masonry and furred walls, shall be shop fabricated or formed at the job by the contractor with tools provided for that purpose by the manufacturer.

G. After the metal base is set in place and the channel studs erected the base shall be grouted with a thin cement fill.

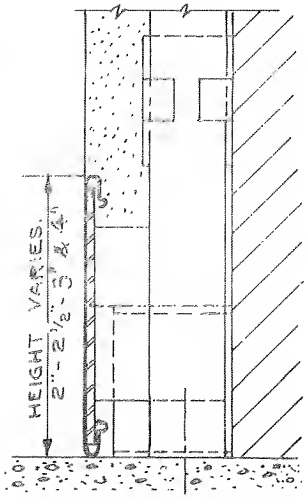


Nº 667 BASE
AT MASONRY WALL.
16, 18 OR 20 GAUGE.

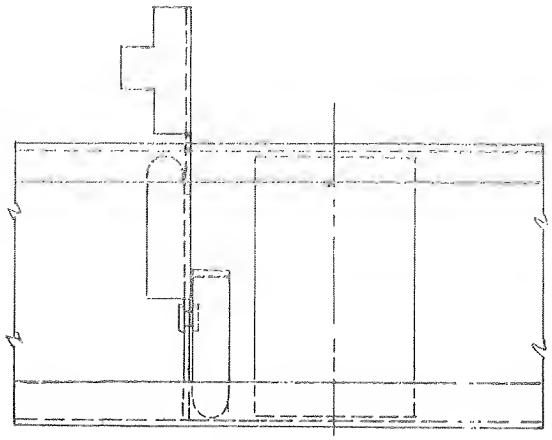




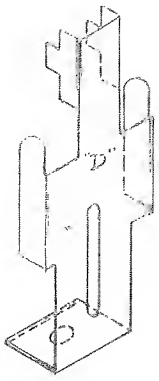
ISOMETRIC VIEW
18 GA. GALV. CLIPS
MASONRY TYPE FURRING TYPE



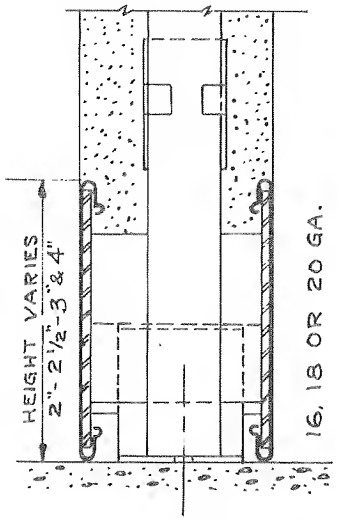
Nº 667 BASE
AT FURRED WALL
16, 18 OR 20 GAUGE.



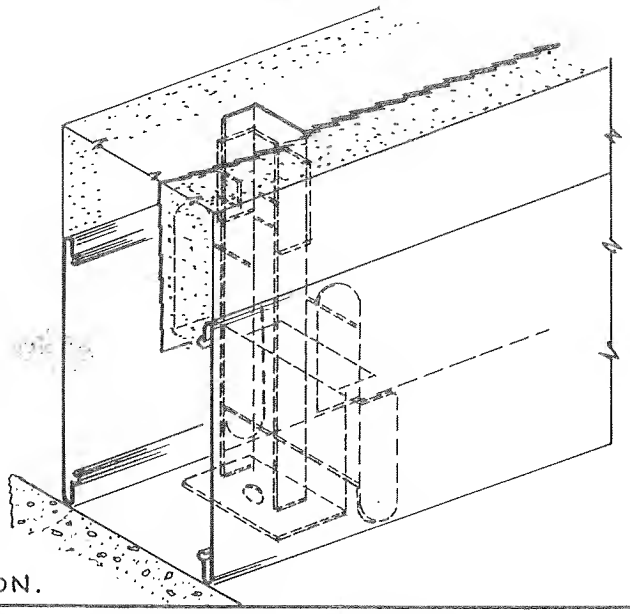
ELEVATION AT JOINT
FROM INSIDE SHOWING SPLICE PLATE AND FURRING CLIP

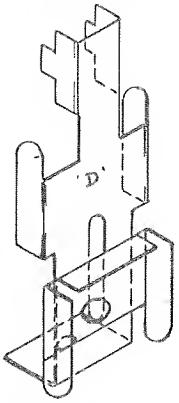


ISOMETRIC VIEW
DOUBLE CLIP - HOLD DOWN MEMBER REMOVED TO SHOW CONSTRUCTION.



Nº 667 BASE
AT 2" PLASTER PARTITION.





ISOMETRIC VIEW
HOLD DOWN CLIP. (ONE PIECE, RIVETED SLIP JOINT FOR ADJUSTMENT TO FLOOR SLAB VARIATION.)

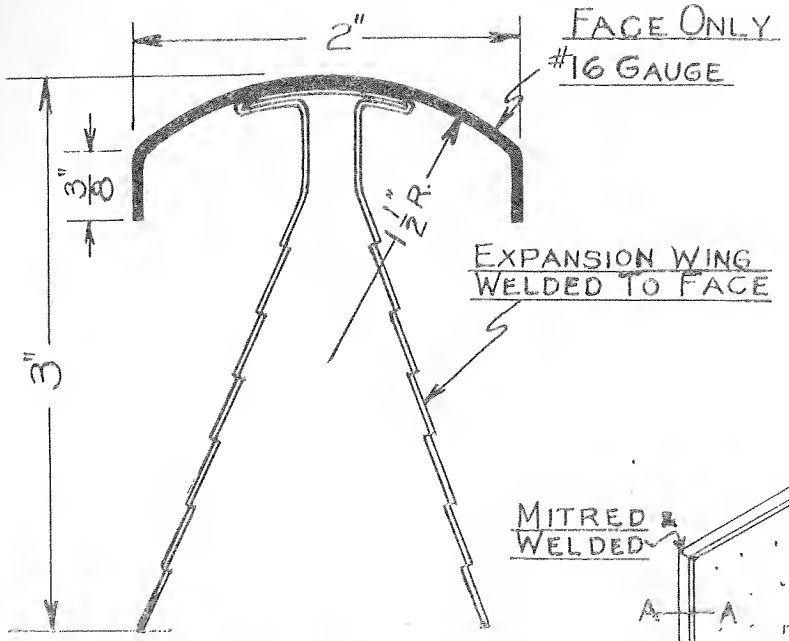
MILCOR BASE TYPE Nº 667.

FOR USE AT MASONRY WALLS, FURRED WALLS OR 2" PLASTER PARTITIONS.

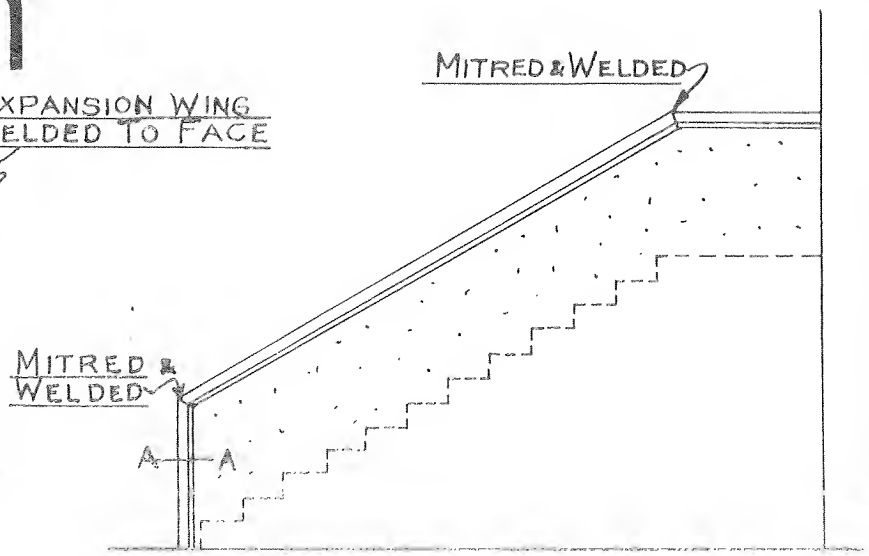
STANDARD DETAIL
Nº 39

MILCOR STEEL CO.
MILWAUKEE, WIS.

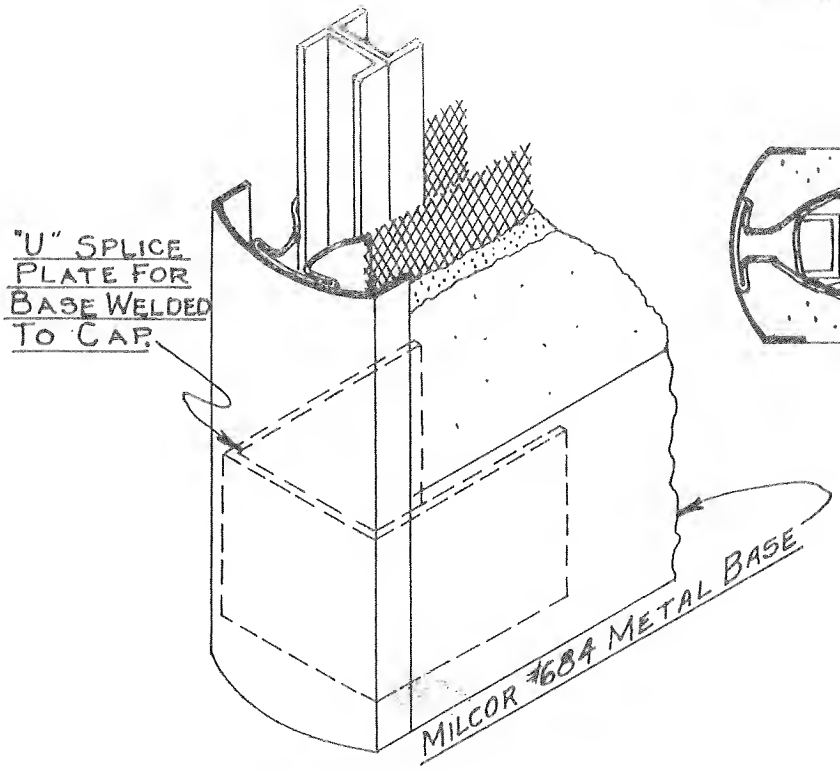
REVISED: 1-9-41



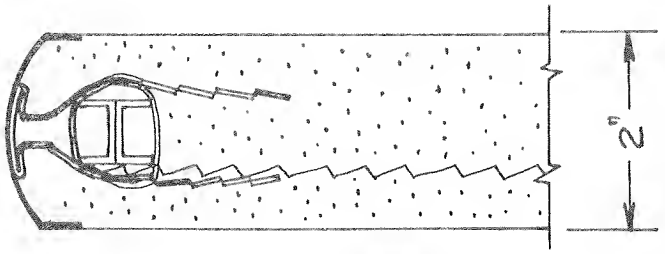
SECTION



#20 PARTITION CAP
USED AS STAIR RAIL CAP.

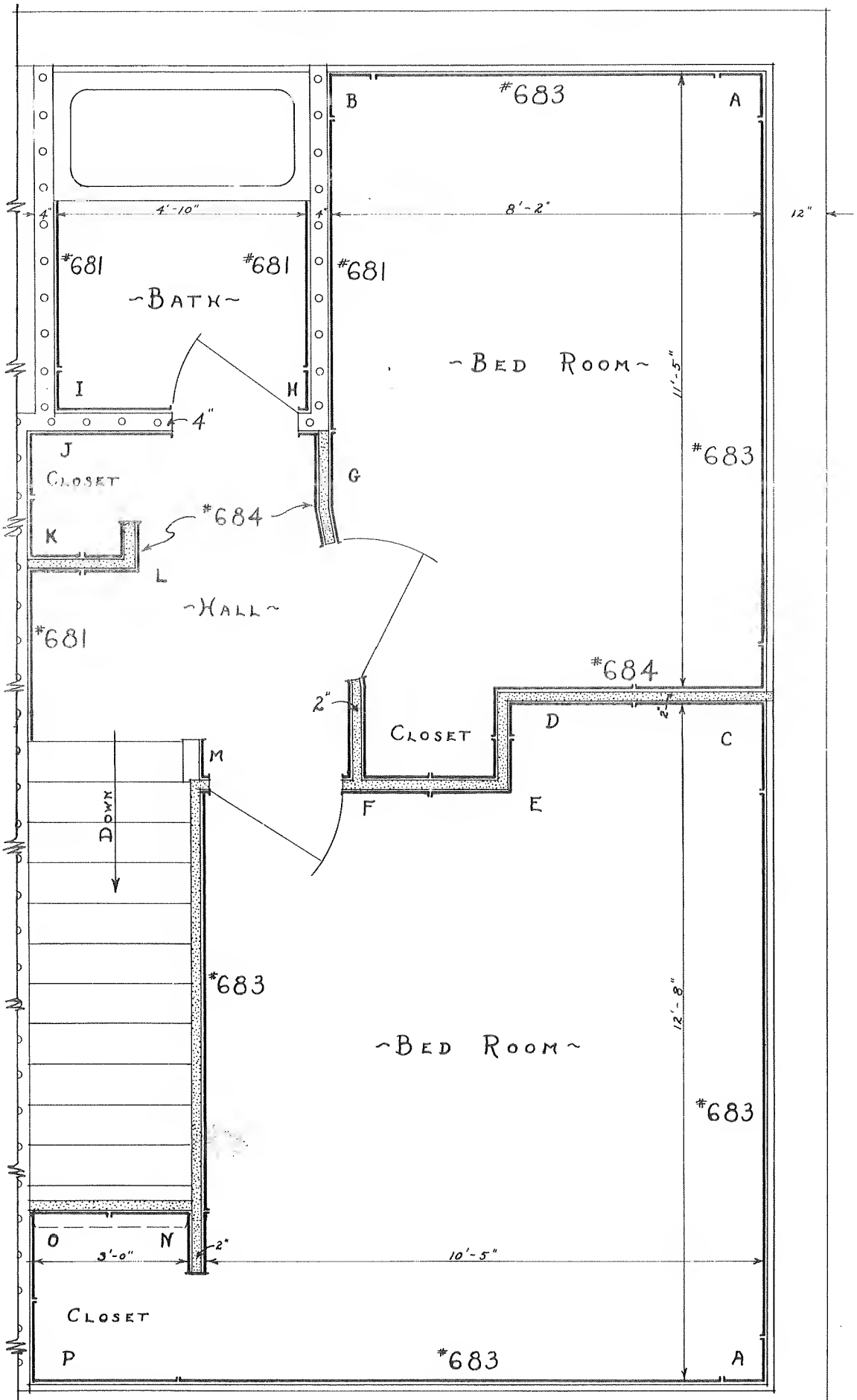


ISOMETRIC
FREE STANDING 2" SOLID
PLASTER PARTITION.

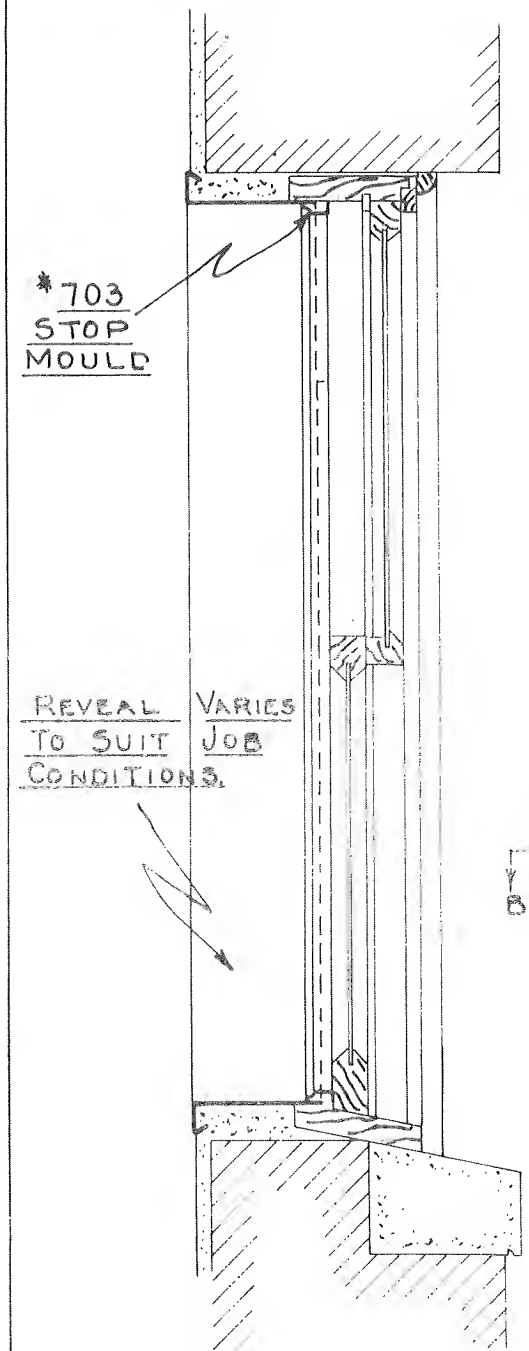


SECTION A-A

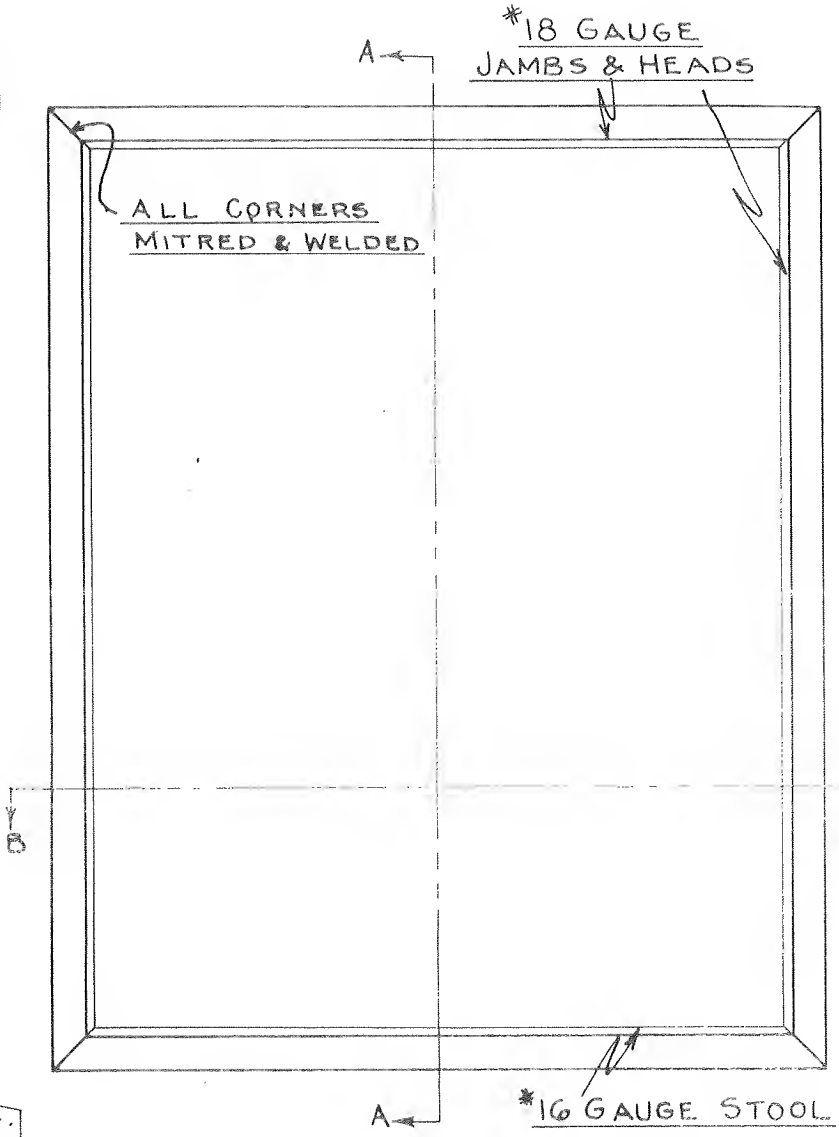
MILCOR #20 PARTITION CAP FOR USE AS STAIR RAIL CAP AND DWARF PARTITION CAP AND AT ENDS OF FREE STANDING 2" SOLID PLASTER PARTITIONS.	STANDARD DETAIL Nº 40
	MILCOR STEEL CO. MILWAUKEE, WIS.



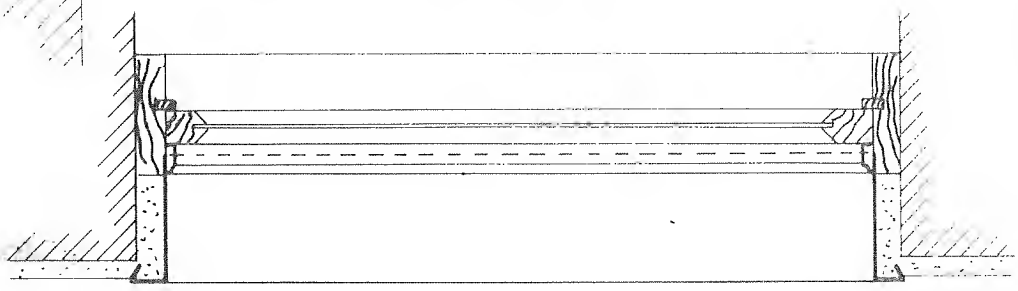
Layout for typical apartment unit. Shop fabricated corners reduce splice joints to absolute minimum.



SECTION AA



ELEVATION OF WINDOW TRIM



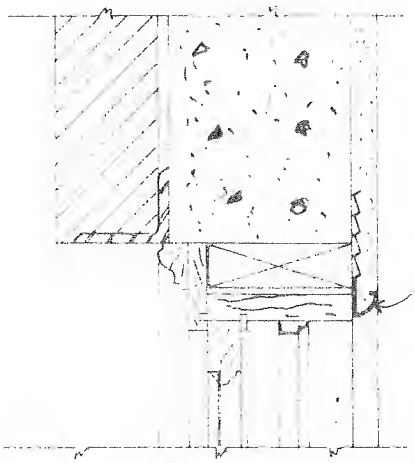
SECTION BB

MILCOR METAL WINDOW TRIM.
FOR USE WITH WOOD SASH WINDOWS.

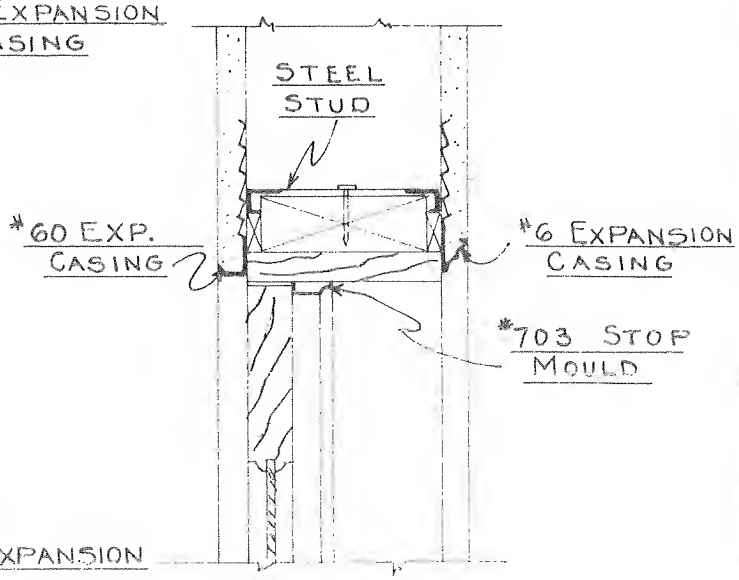
STANDARD DETAIL
Nº 50

MILCOR STEEL CO.
MILWAUKEE, WIS.

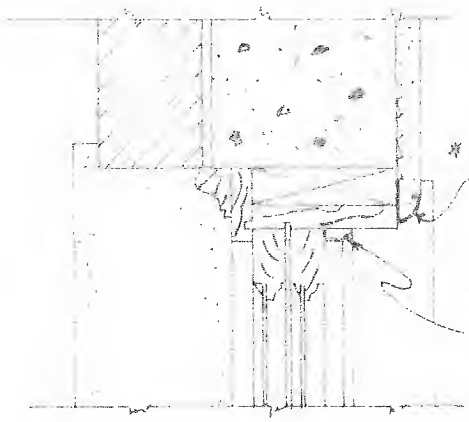
REVISED: 7-1-1940



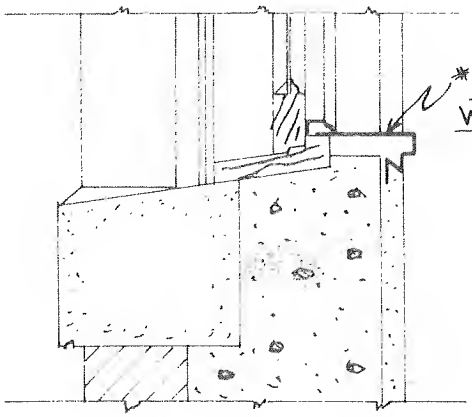
HEAD SECTION



HEAD & JAMB SECTION
DOOR



JAMB SECTION



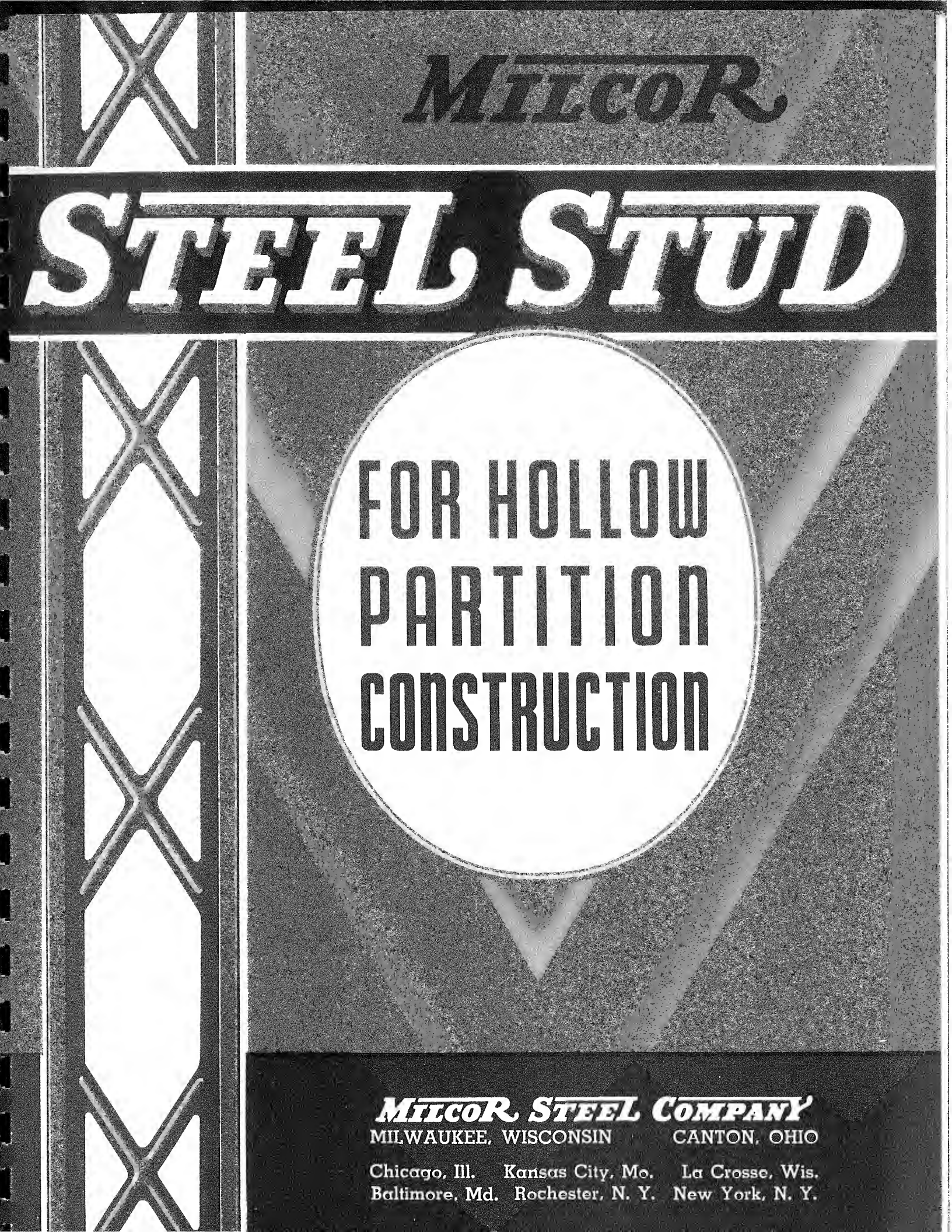
SILL SECTION
WINDOW

INSTALLATION DETAILS OF MILCOR EXPANSION CASINGS AND *521 WINDOW STOOL.

STANDARD DETAIL
Nº 51

MILCOR STEEL CO.
MILWAUKEE, WIS.

REVISED: 7-1-1940


MILCOR
STEEL STUD
FOR HOLLOW
PARTITION
CONSTRUCTION
MILCOR STEEL COMPANY
MILWAUKEE, WISCONSIN CANTON, OHIO
Chicago, Ill. Kansas City, Mo. La Crosse, Wis.
Baltimore, Md. Rochester, N. Y. New York, N. Y.

MILCOR STEEL STUD

The MILCOR STEEL STUD is without question the strongest stud manufactured. In addition to extreme strength, its design provides numerous other advantages which not only make for better construction, but make possible a SAVING in construction costs. With MILCOR LATH this stud provides a hollow partition of exceptional rigidity.

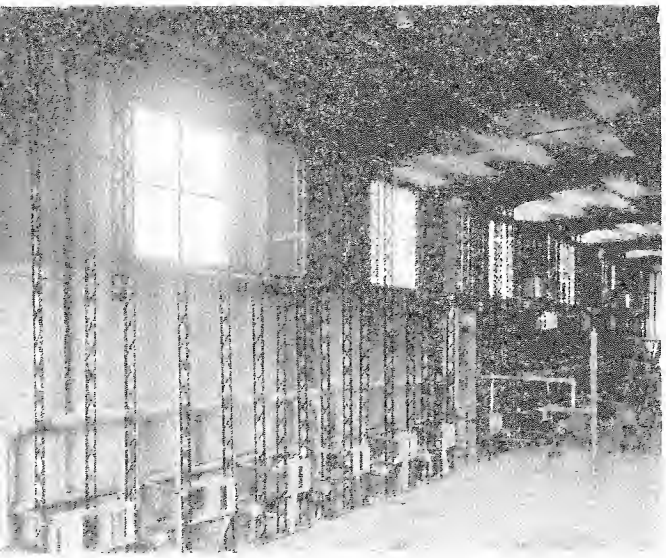
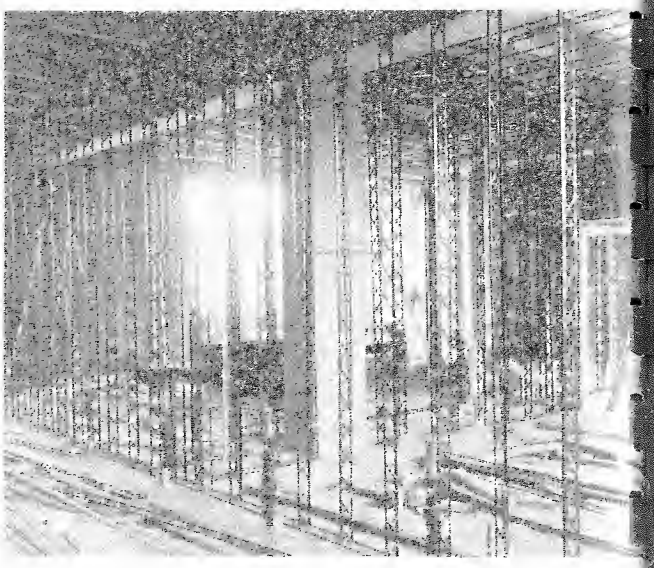


Illustration at left shows MILCOR STEEL STUDS used as a furring wall in a room with a comparatively high ceiling. Adaptability to ventilation systems and piping is particularly evident in this picture.

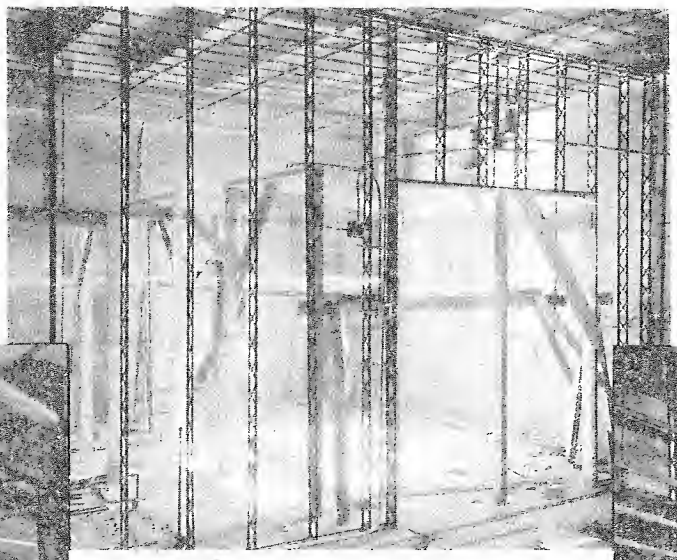
Illustration at right shows a partition sixteen feet high being built with MILCOR STEEL STUDS. The floor runners and ceiling runners were attached by nailing into the concrete.



The MILCOR STEEL STUD is a unit of the MILCOR SYSTEM OF FIREPROOF CONSTRUCTION which includes a great range of products, types, weights, etc., so that a complete co-ordinated steel "backbone" may be designed to meet any condition of fireproof construction. All MILCOR products are engineered to work together.

Photos taken at the Los Angeles Union Station. Consulting Architects, John and Donald B. Parkinson; Construction Engineer for Railways, A. J. Barclay; General Contractor, Robert E. McKee; Lather and Plaster, Elwood E. Schwenk; Dealers, Mutual Building Material Company.

The ease of installation of electrical conduits, water pipes, etc., in connection with MILCOR STEEL STUDS is readily apparent in the photograph shown below. The studs themselves are strong, but much less bulky than wooden or other types—and the large uniform perforations permit the passage of electrical, heating and water equipment without expensive cutting and fitting.



Lower illustration shows the use of MILCOR STEEL STUDS in connection with a suspended ceiling. In this picture channels for the ceiling have been hung but the lath is not yet applied. The lath is applied to the lower part of the studs, however, and when tied to the lath from the ceiling a continuous steel reinforcement will be provided as a base for the plaster.

The ready adaptability of MILCOR STEEL STUDS to framing for doors and other openings is depicted above. A steel frame of the proper size can be easily made with the MILCOR STUD. Members on each side of the opening are placed facing each other so that the cross member may be quickly and firmly attached with the special Milcor shoe. Openings of many sizes can thus be framed in steel and the wood framework quickly applied by nailing direct to the studs.

3 EXCLUSIVE FEATURES OF THE MILCOR STEEL STUD

THE STRONGEST, HEAVIEST, BEST-DESIGNED, STEEL STUD MANUFACTURED

The new embossed X-shaped MILCOR STEEL STUD embodies by far the most advanced engineering design and the greatest number of advantages to the user of any type of stud on the market.

In Addition to Its Exclusive Design Features the Milcor Steel Stud Offers:

FIRE-SAFETY:

MILCOR HOLLOW PARTITIONS with Metal Lath are given a one to two hour fire rating, depending upon plaster used.

EARTHQUAKE RESISTANCE:

Architects and Engineers agree that there is no other type of partition construction which will resist earthquakes, explosions, etc., as much as that made with Steel Studs and Metal Lath.

INSULATING VALUE:

Because the partitions are hollow they have exceptional insulating value. If additional insulation is desired the application of any of the many insulating materials is easily made in connection with the Steel Stud.

SOUND RESISTANCE:

Hollow partitions are effective barriers to sound. Their sound insulating value compares favorably with clay or gypsum partitions which weigh a great deal more.

LIGHT WEIGHT:

The use of the Steel Stud permits economical construction design because of its light weight as compared to other types of partitions.

ELIMINATION OF PLASTER CRACKS:

Steel Studs are not affected by moisture, cannot swell, warp or split. They are held firmly in place and eliminate the principal causes of plaster cracking when used in connection with Metal Lath.

Milcor Steel Studs when used with Metal Lath and plaster produce a partition-strength equal to, or greater than, tile or Gypsum block of equivalent thickness. Moreover they have two indisputable advantages over masonry partitions:

First—Extraordinary resistance to explosion.

Second—An absolute tie to floor and ceiling.

Patent Applied For

1

CHANNEL SIDES:

The exclusive channel sides of the MILCOR STEEL STUD make it by far the strongest on the market. Furthermore, the extra flange provides a means for a positive lock for shoes, connections, wood blocks, and other attachments.

2

LARGE, UNIFORM OPENINGS:

The spacing of openings for conduits and pipes is uniform on centers regardless of the size of the stud. This provides a predetermined exact location of all conduits or pipe lines in the wall.

3

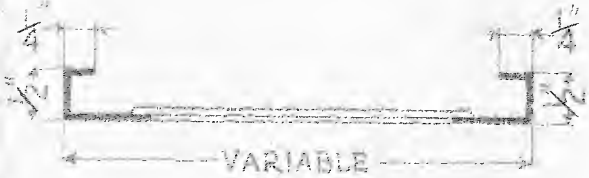
REINFORCED X-SHAPED MEMBERS

The short-span X-shaped framing, strongest known to science, is reinforced by an embossed corrugation which extends into the channel sides beyond the opening.

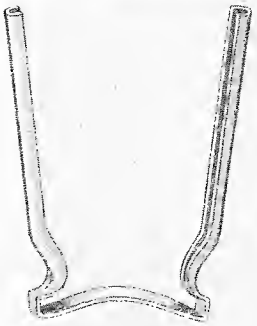
The width of the chords in all sizes is three-quarters of an inch. This uniform width permits the use of ¾-inch furring channels where necessary between studs.

The MILCOR STEEL STUD serves a three-fold purpose—as studding, ceiling runner, and floor track. A 3/16-inch hole in the center of the X member of the floor and ceiling runners make nailing or bolting convenient and easy.

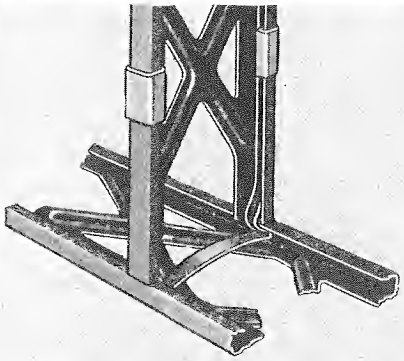
MILCOR STEEL STUDS require a very small amount of storage space. They are easy to handle and not ordinarily subject to damage in transit.



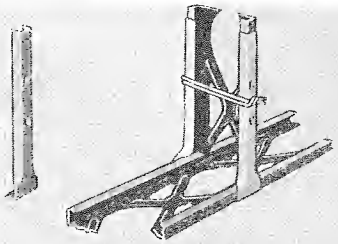
Positively the Strongest Stud on the M



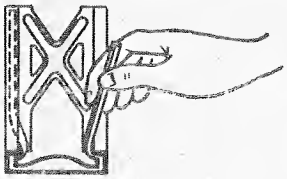
Milcor Internal Type Shoe for Steel Stud.



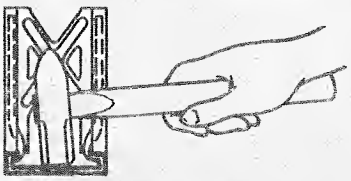
Complete Application of Shoe—With Stud Attached to Floor Runner.



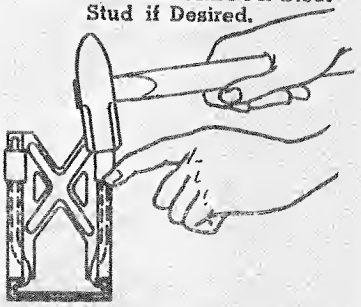
External Type Shoes May Be Used with the MILCOR Steel Stud if Desired.



Shoe is Slipped into Channel Sections of Floor Runner and Stud as Shown.



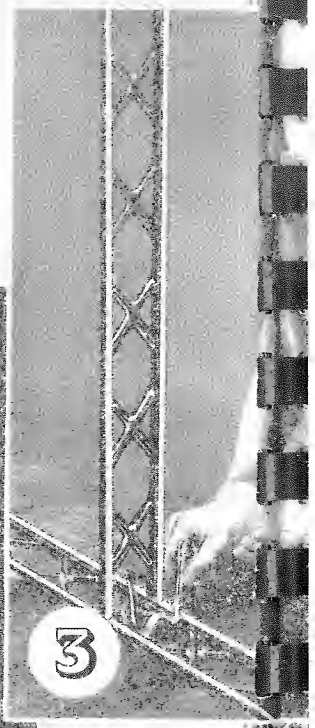
Shoe is Wedged into Floor Runner by Tapping with Hammer.



Clips Slip Around Channel Sections and Shoe Arms — Wedged Tightly with One Blow of Hammer.

The application of the MILCOR SHOE is simplicity itself. The shoe fits into the channel sections of the members to be joined, is quickly wedged into the floor runner by tapping with a hammer and to the stud section with special clips. External shoes may be used if desired.

Almost as important as the strength-producing design of the stud itself has been the development of a shoe for attaching one member to another with remarkable speed and exceptional rigidity. With this shoe a firm attachment of the stud can be made to floor or ceiling runners and also to studs in horizontal position. Thus a number of combinations can be built up to allow for openings of any desired size—at the same time retaining a steel foundation of extreme rigidity.



Illustrations show the simple operations of erecting MILCOR STUDS.

1. Ceiling runner is simply nailed through 3/16 inch hole provided in center of X-shaped member.
2. Floor runner is applied in a similar manner.
3. Shoe is slipped into floor runner and stud.

Erected at Definite Savings in Cost

The Cost Saving Features of the MILCOR STEEL STUD Rival Its Advantages for Strong Satisfactory Construction

Undeniable savings in erection are achieved because of:

1—Remarkably quick attachment with the MILCOR SHOE.

2—Variety of positions in which the same shoes and studs may be locked.

3—Elimination of confusion with materials—only one standard unit.

4—Large, uniform openings enable quick installation of pipes and conduits.

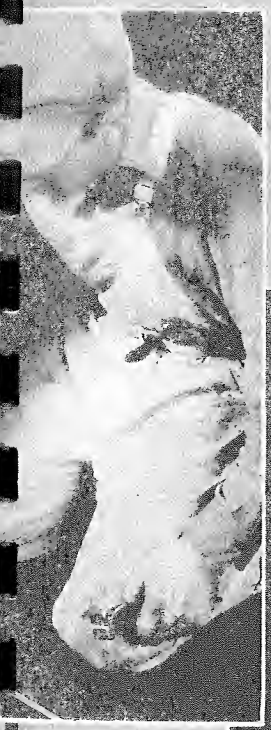
5—Exceptional strength requires less horizontal bridging.

6—Quickly cut to length on the job or pre-cut if desired.

7—Channel sides guard against damage in transit.

8—Practically no cleaning up costs after installation.

The above savings are of definite value as every architect and contractor knows. They include things that cost real dollars and cents on the job.



4. Wedged to floor runner by tapping with hammer.
5. Wedged to stud by application of clips. Operation is the same for both floor and ceiling runners.

Application of MILCOR SHOES is the same for cross members as for regular studs. The operation is exceedingly simple.

The MILCOR HOLLOW PARTITION SYSTEM is adaptable to all construction conditions. It permits continuous operation of all trades. Plumbing, electrical, and heating equipment are installed immediately after the studs are set. Lathing and plastering can follow without delay. The system is designed to work with practically all types of corner beads, picture moulds, base screeds, chair rails, metal bases, access doors, etc.

SPECIFICATIONS for MILCOR STEEL STUD

PARTITIONS—To be made with MILCOR STEEL STUD, using ceiling and floor runner tracks, and Milcor shoes.

ERECTION STEPS—

1. Runner tracks to be aligned and securely attached to floor, ceiling or walls with concrete stub nails (or 3/16 inch toggle bolts, in existing suspended ceilings). In new suspended ceilings runner track is to be wired to channels.
2. Erect MILCOR STUDS in accordance with recommended spacing as follows:

RECOMMENDED STUD SPACING FOR VARIOUS WEIGHTS OF MILCOR METAL LATH

TYPE AND WEIGHT OF METAL LATH	RECOMMENDED SPACING OF STUDS
2.5 lb. Netmesh Lath	12 inches
3.0 lb. Netmesh Lath	12 inches
3.4 lb. Netmesh Lath	16 inches
2.75 lb. Kuehn's Specialmesh or Stay-rib No. 1	16 inches
3.0 lb. Kuehn's Specialmesh or Stay-rib No. 1	20 inches
3.4 lb. Kuehn's Specialmesh or Stay-rib No. 1	20 inches
2.5 lb. 3/8" Stay-rib No. 2	16 to 20 inches
3.0 lb. 3/8" Stay-rib No. 2	16 to 24 inches
3.4 lb. 3/8" Stay-rib No. 2	28 to 32 inches
4.0 lb. 3/8" Stay-rib No. 2	32 inches

3. MILCOR SHOES to be used for attaching studs to floor and ceiling runners and cross members as required.

METAL LATH—

To be MILCOR (see table for type and weight recommended for use with various stud spacings).

APPLICATION OF ACCESSORIES—

1. Corner beads with 2½ inch wing to be installed where partition joins masonry or concrete on walls or ceiling. If corner beads are not used, Metal Lath must be bent around corners to this dimension. Milcor Expansion Corner Bead No. 1 on external corners.
2. Picture mould and chair rail may be applied directly over Lath or wood grounds which may be wired flush to studs or wedged between stud channels.

CONCRETE STUB NAILS—

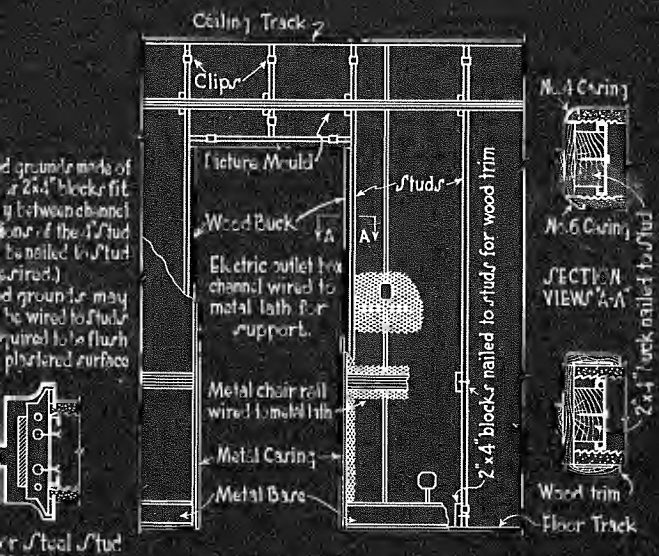
¾ inch concrete stub nails are to be used for attaching floor and ceiling runners.

MILCOR STEEL STUDS are furnished in 6, 7, 8, 9, 10, 12, 14, 16, 18 and 20 foot lengths. Track is always in 10 foot lengths. Intermediate lengths cut from next longer stock length. Made from 16 Gauge Steel.

The necessary number of shoes and clips is furnished with the studs. When ordering, mention number required—figuring two internal shoes complete with sleeves for every stud length and additional shoes necessary where studs are framed around openings. External type shoes furnished if desired.

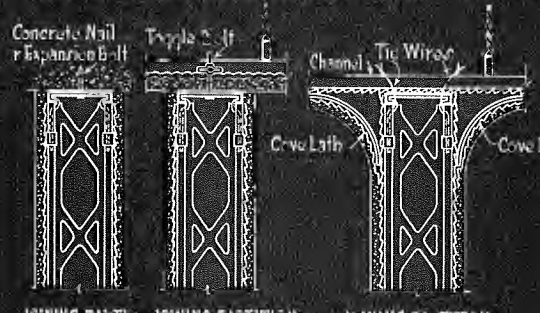
CONSTRUCTION DETAILS

MILCOR STEEL STUDS are adaptable to every type of fireproof construction. Expansion corner beads, picture mould, chair rails, metal or wood casing, metal door bucks, wood or metal window frames, wood or metal base, cove lath and other equipment are applied in the regular manner.



ELEVATION OF PARTITION SHOWING WOOD DOOR BUCK AND METAL TRIM

METHOD OF INSTALLING WINDOW FRAME



JOINING PARTITION TO CONCRETE CEILING SLAB

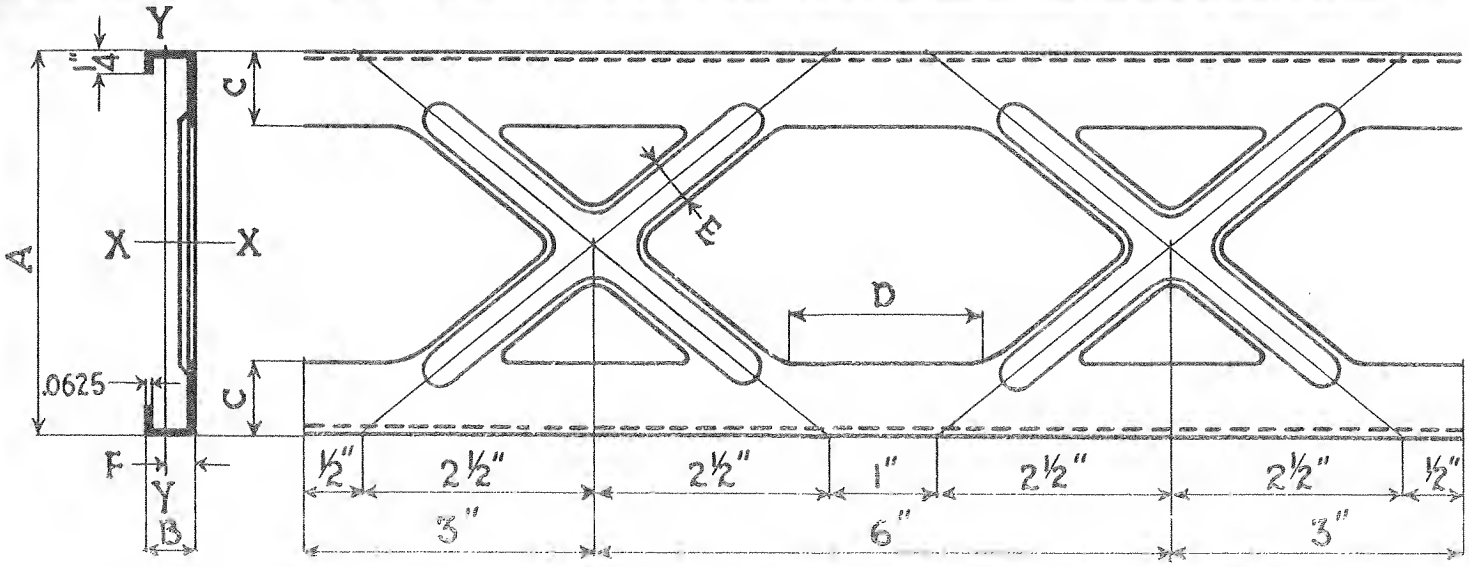
JOINING PARTITION TO SUSPENDED PLASTERED CEILING

JOINING PARTITION TO CHANNEL OF SUSPENDED CEILING

JOINING PARTITION TO MASONRY WALL

CORNER CONSTRUCTION

PROPERTIES OF MILCOR STEEL STUDS



SCALE: HALF SIZE

All Dimensions in Inches						Area Sq. Ins.	Axis x-x			Axis y-y		
A	B	C	D	E	F		I	S	r	I	S	r
2	½	⅜	2	⅜	.223	.125	.099	.099	.890	.004	.015	.184
2¼	½	½	2¼	⅜	.200	.140	.136	.121	.985	.005	.016	.183
3	½	¾	2¾	⅜	.171	.172	.283	.189	1.28	.005	.017	.177
3¼	½	¾	2¾	⅜	.171	.172	.341	.210	1.41	.005	.017	.177
4	½	¾	2	½	.171	.172	.544	.272	1.78	.005	.017	.177
6	½	¾	1½	½	.171	.172	1.46	.485	2.78	.009	.017	.177

SAFE TOTAL LOAD IN POUNDS PER LINEAR FOOT OF STUD

Simple Span. Uniform Load. Working Stress 15,000 Pounds Per Square Inch

Size in Ins.	CLEAR SPAN IN FEET															
	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
2	39	27	20	15	12	9	..	..	..	..	..	..	..	..	..	..
2¼	48	33	25	19	15	12	10	8	..	..	..	..	..	..	..	..
3	75	52	38	28	23	19	15	13	11	..	..	..	..	..	..	..
3¼	84	58	43	33	26	21	17	14	12	10	..	..	..	..	..	..
4	108	75	55	42	33	27	22	19	16	14	12	10	..	..	..	..
6	..	134	98	75	59	48	40	33	28	25	21	19	16	15	13	12

The load per square foot for any spacing is equal to the tabular load x 12/spacing in inches. EXAMPLE: What is the safe load that 6 inch studs spaced 16 inches on centers, span 11 feet, will support? Tabular value is 40, therefore 40 x 12/16 equals 30 pounds per square foot.

The spacing in inches for any load is equal to the tabular load x 12/load per square foot. EXAMPLE: What spacing will be required for 4 inch studs, span 10 feet, to support 20 pounds per square foot? Tabular value is 27, therefore 27 x 12/20 equals 16.2 inches on centers. Use 16 inches.

The safe total load for any stress is equal to the tabular load x the stress/15,000. EXAMPLE: What safe load per linear foot will be supported by 4 inch studs, span 10 feet, with 18,000 pounds per square inch working stress? Tabular value is 27, therefore 27 x 18,000/15,000 equals 32.4 pounds per linear foot.

To support the tabular loads, studs must be braced laterally and securely connected to the structure.

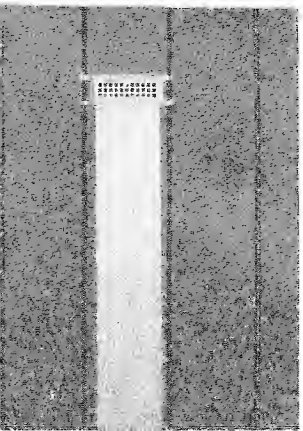


Illustration at the left shows how easily heating equipment is applied in connection with MILCOR STEEL STUDS.

Center illustration shows complete section built up with MILCOR STEEL STUDS, Netmesh metal lath, Expansion picture mould, Expansion door casing, Milcor Cove Lath, and Milcor Metal Base.

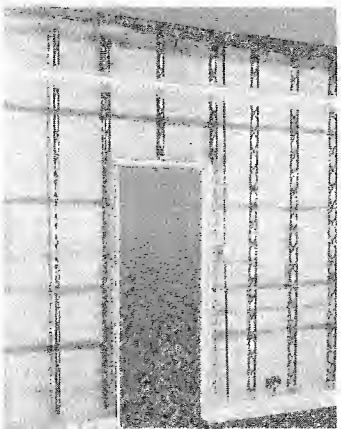
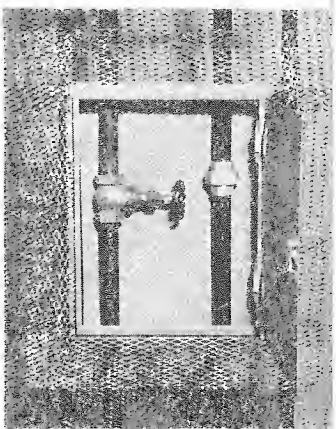


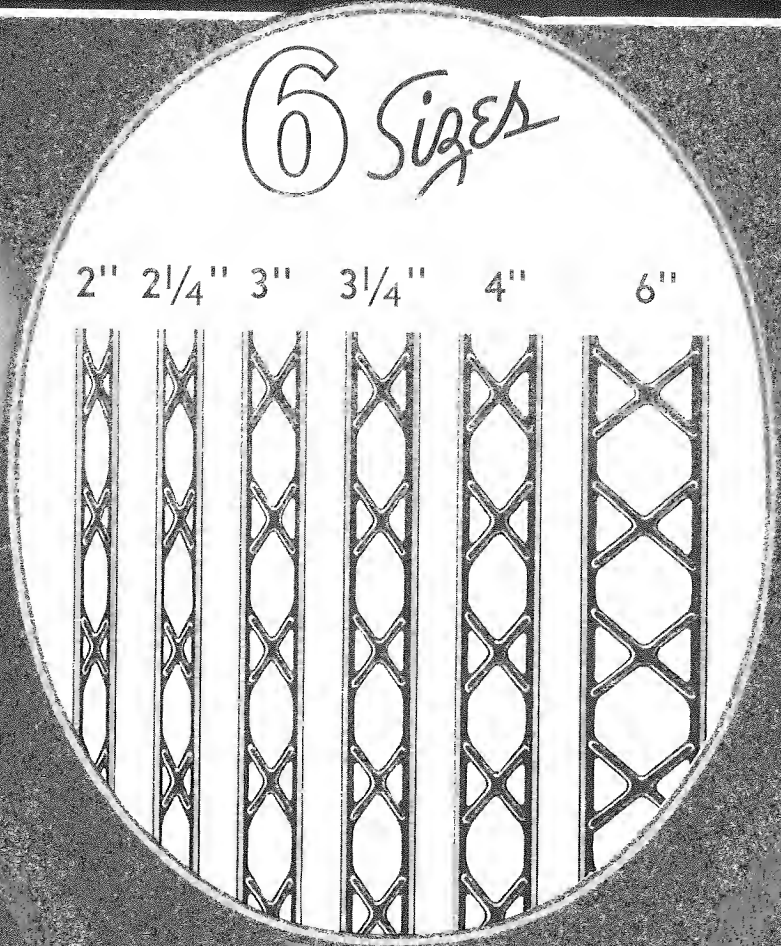
Illustration to the right shows MILCOR Metal Access Door with Expansion wings used in connection with MILCOR STEEL STUDS. Note that the door is wired directly to lath and studs. Surface of door is flush with finished plaster. Everywhere this Steel Stud makes for stronger, better, less costly construction.



MILCOR

STEEL STUD

6 Sizes



STANDARD SIZES AND WEIGHTS

MILCOR STEEL STUDS are made in six standard sizes as follows: 2, 2¼, 3, 3¼, 4 and 6 inches. Made from 16 Gauge Steel.

WEIGHTS—POUNDS PER 1,000 FEET

2 inch size—500 lbs.	3 inch size—660 lbs.	4 inch size—700 lbs.
2¼ inch size—570 lbs.	3¼ inch size—720 lbs.	6 inch size—880 lbs.

MILCOR STEEL STUDS are furnished in 6, 7, 8, 9, 10, 12, 14, 16, 18 and 20 foot lengths. Track is always in 10 foot lengths. Intermediate lengths cut from next longer stock length.

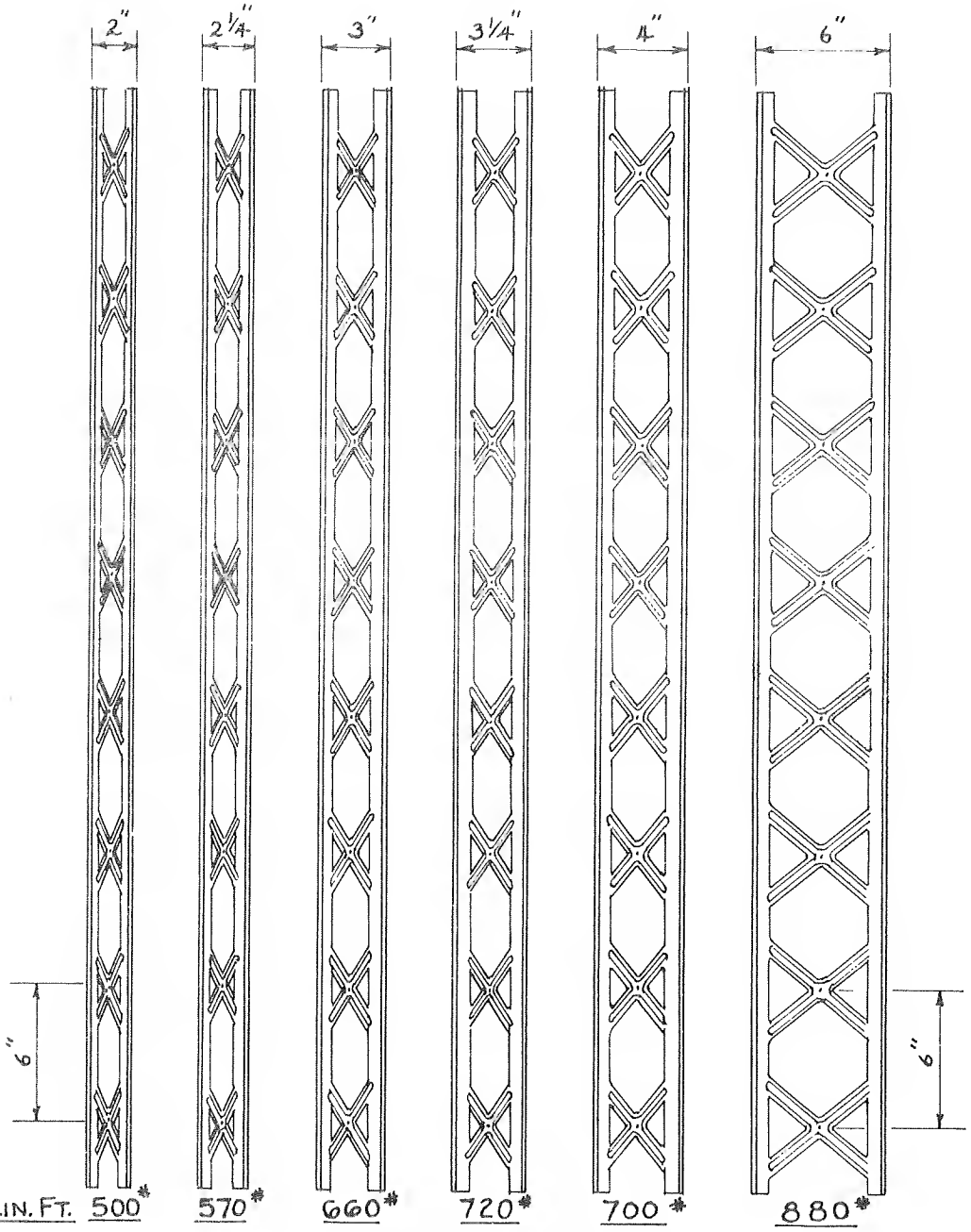
MILCOR STEEL STUDS can be furnished with an "open track"—without the extra lip which forms the channel section at the side of the stud. Made on order at no additional cost.

MILCOR STEEL COMPANY

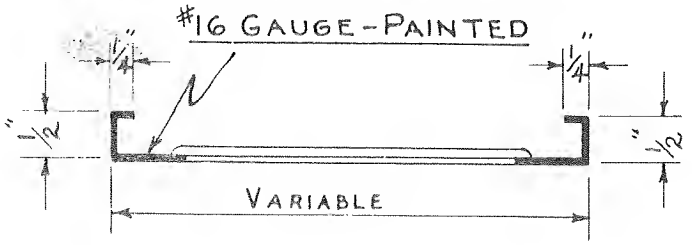
MILWAUKEE, WISCONSIN CANTON, OHIO

Chicago, Ill. Kansas City, Mo. La Crosse, Wis.
Baltimore, Md. Rochester, N. Y. New York, N. Y.

MILCOR HOLLOW METAL STUDS - AVAILABLE IN 6, 7, 8, 9, 10, 12, 14, 16, 18 & 20 FOOT LENGTHS. INTERMEDIATE & LONGER LENGTHS FURNISHED ON SPECIAL ORDER.



WTS. PER M LIN. FT.	500#	570#	660#	720#	700#	880#

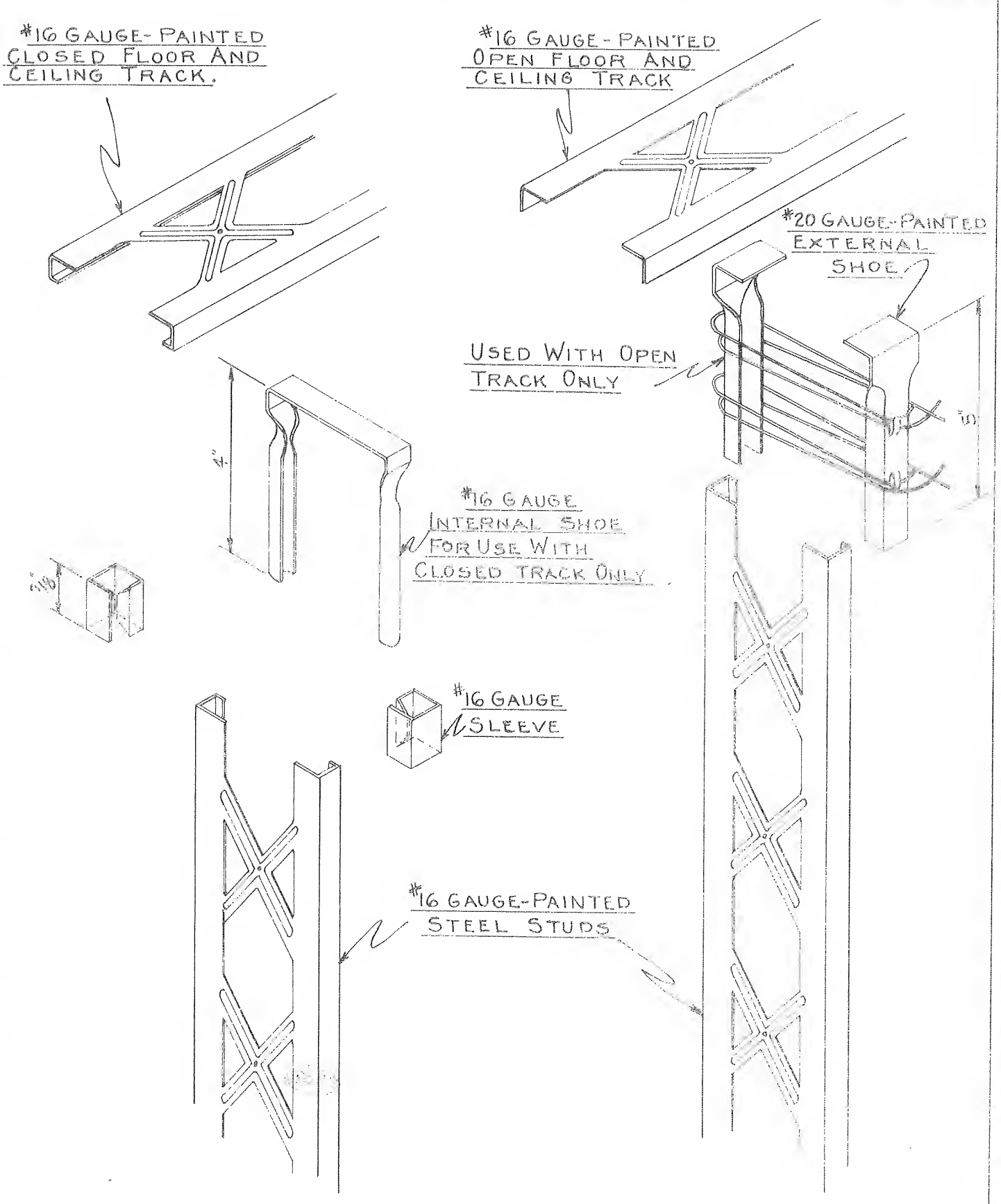


MILCOR HOLLOW METAL STUDS.

STANDARD DETAIL
Nº 1

MILCOR STEEL CO.
MILWAUKEE, WIS.

REVISED: 7-1-1940

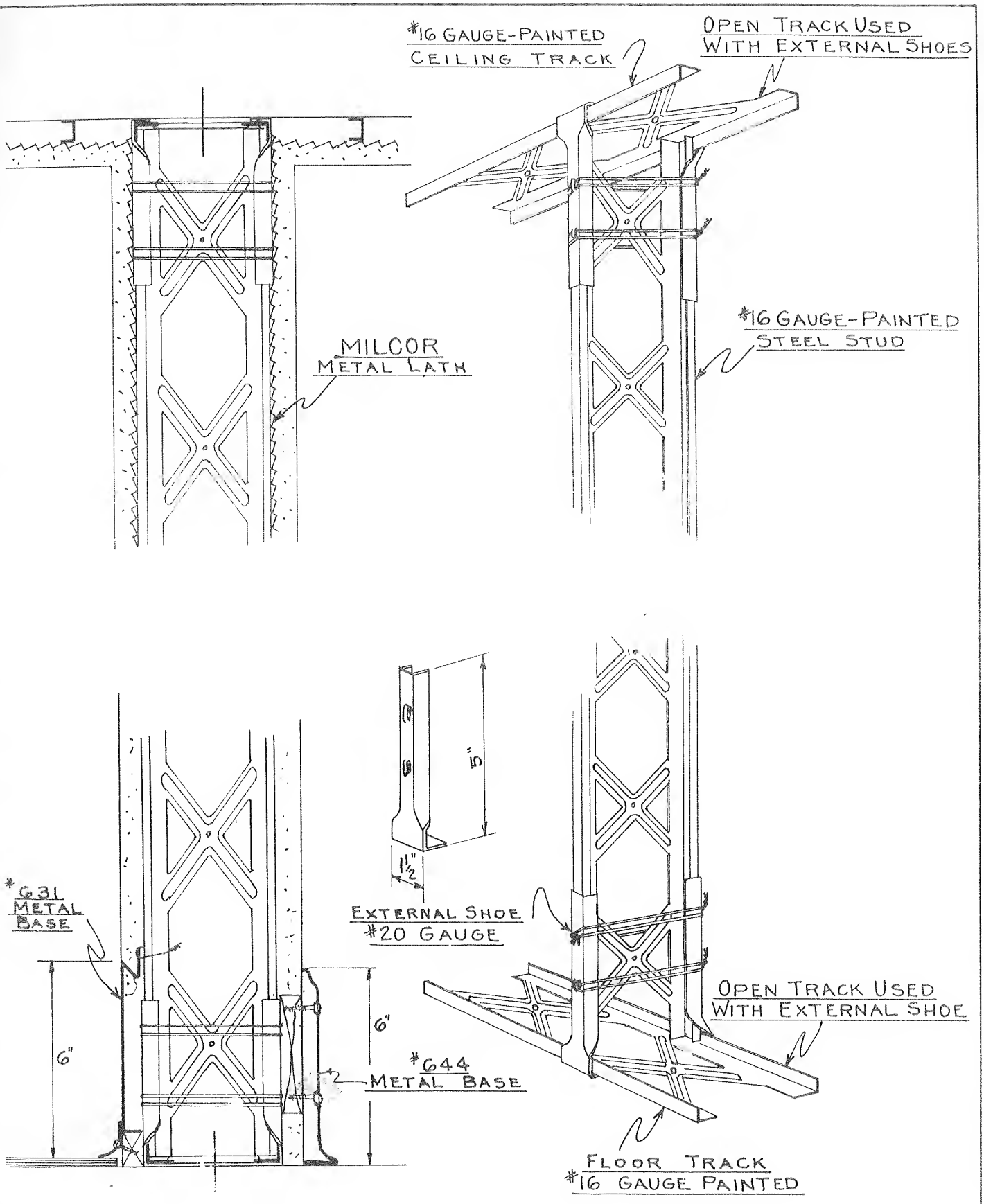


ACCESSORIES FOR MILCOR HOLLOW METAL STUDS.

STANDARD DETAIL N° 2

MILCOR STEEL CO. MILWAUKEE, WIS.

REVISED : 7-1-1940

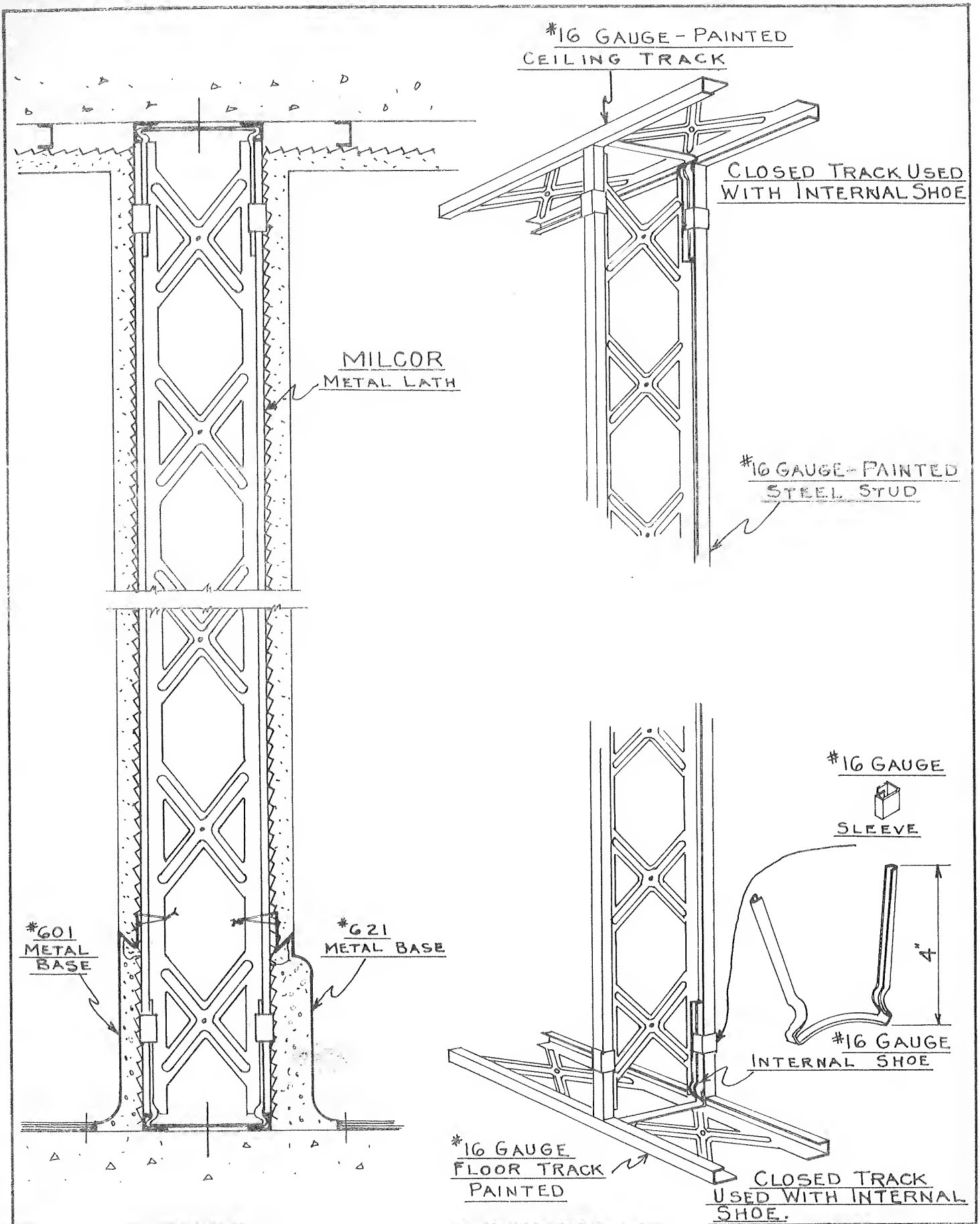


INSTALLATION DETAILS OF MILCOR HOLLOW METAL STUDS WITH OPEN TRACK AND EXTERNAL SHOES.

STANDARD DETAIL
Nº 3

MILCOR STEEL CO.
MILWAUKEE, WIS.

REVISED: 7-1-1940

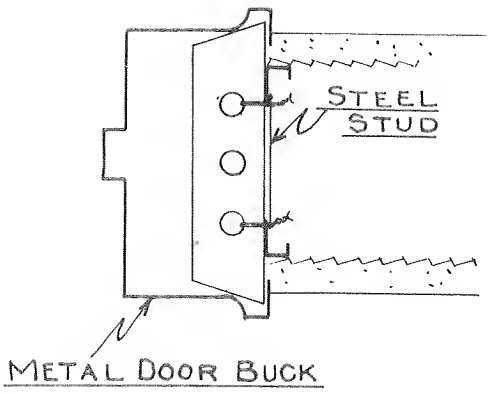


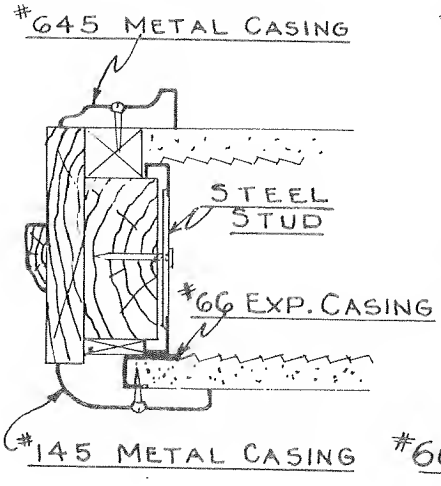
INSTALLATION DETAILS OF MILCOR HOLLOW METAL STUDS WITH CLOSED RUNNER TRACKS AND INTERNAL SHOES.

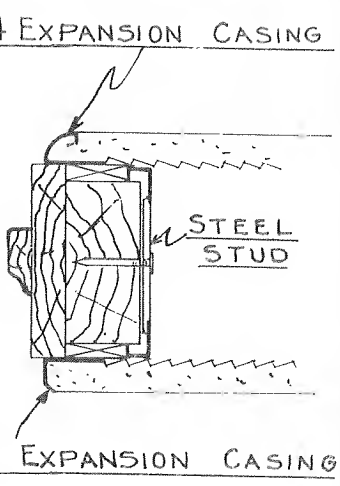
STANDARD DETAIL
Nº 4

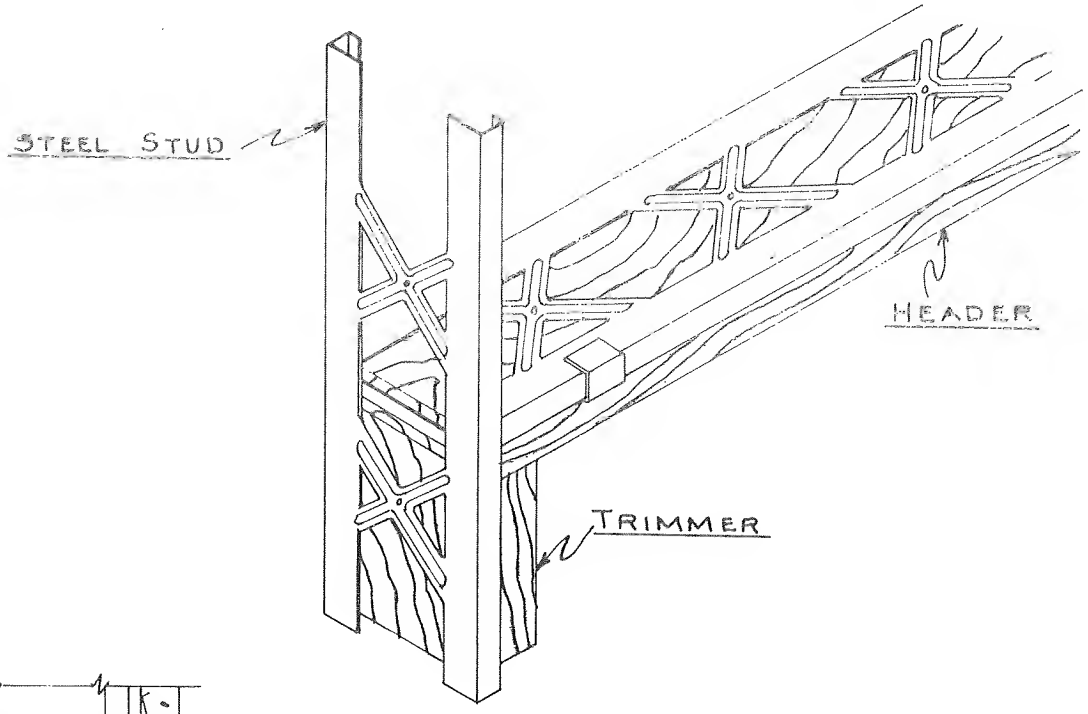
MILCOR STEEL CO.
MILWAUKEE, WIS.

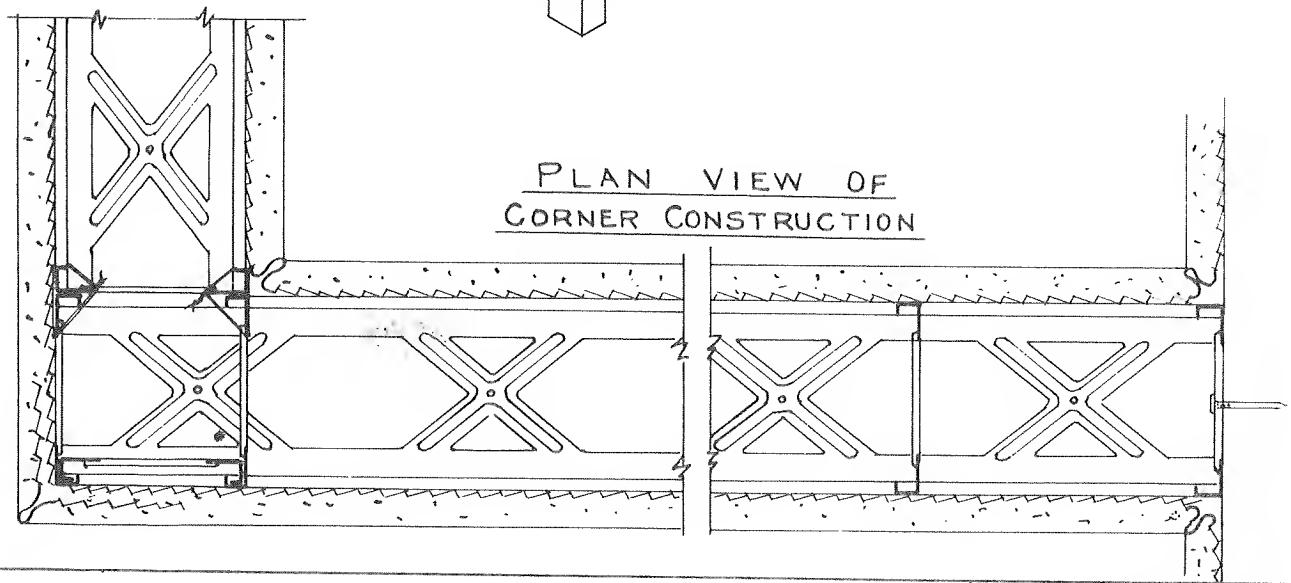
REVISED: 7-1-1940











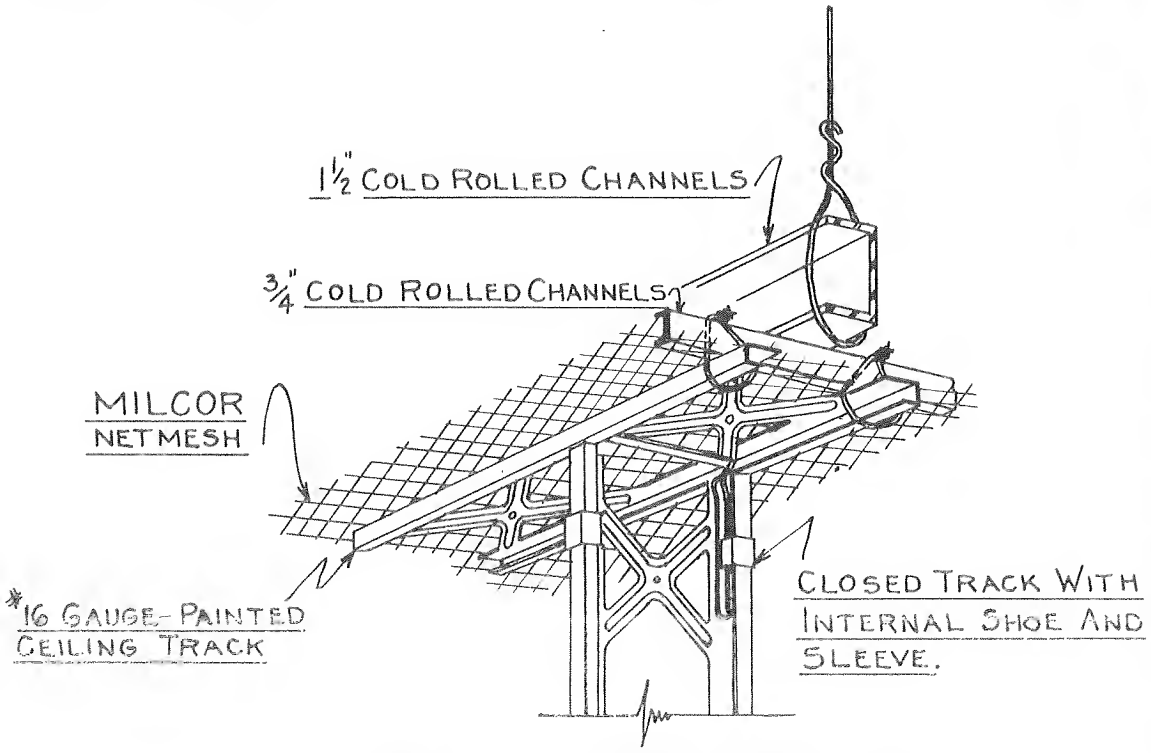
PLAN VIEW OF CORNER CONSTRUCTION

FRAMING DETAILS OF MILCOR HOLLOW METAL STUDS.

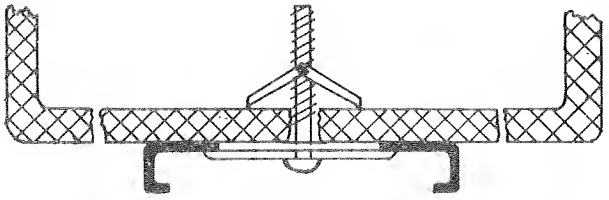
STANDARD DETAIL Nº 5

MILCOR STEEL CO. MILWAUKEE, WIS.

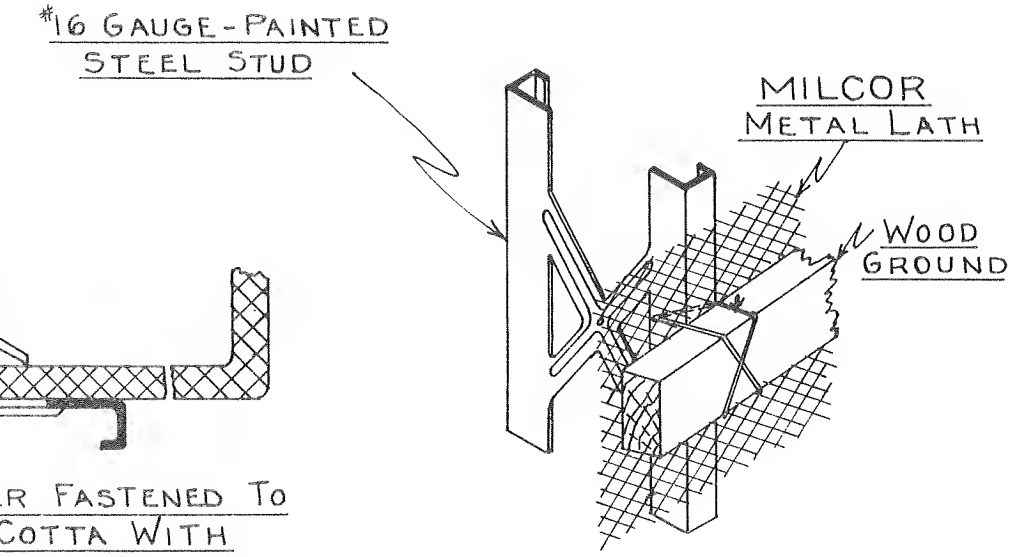
REVISED: 7-1-1940



SUSPENDED CEILING DETAIL



CHANNEL RUNNER FASTENED TO
HOLLOW TERRA COTTA WITH
TOGGLE BOLT.



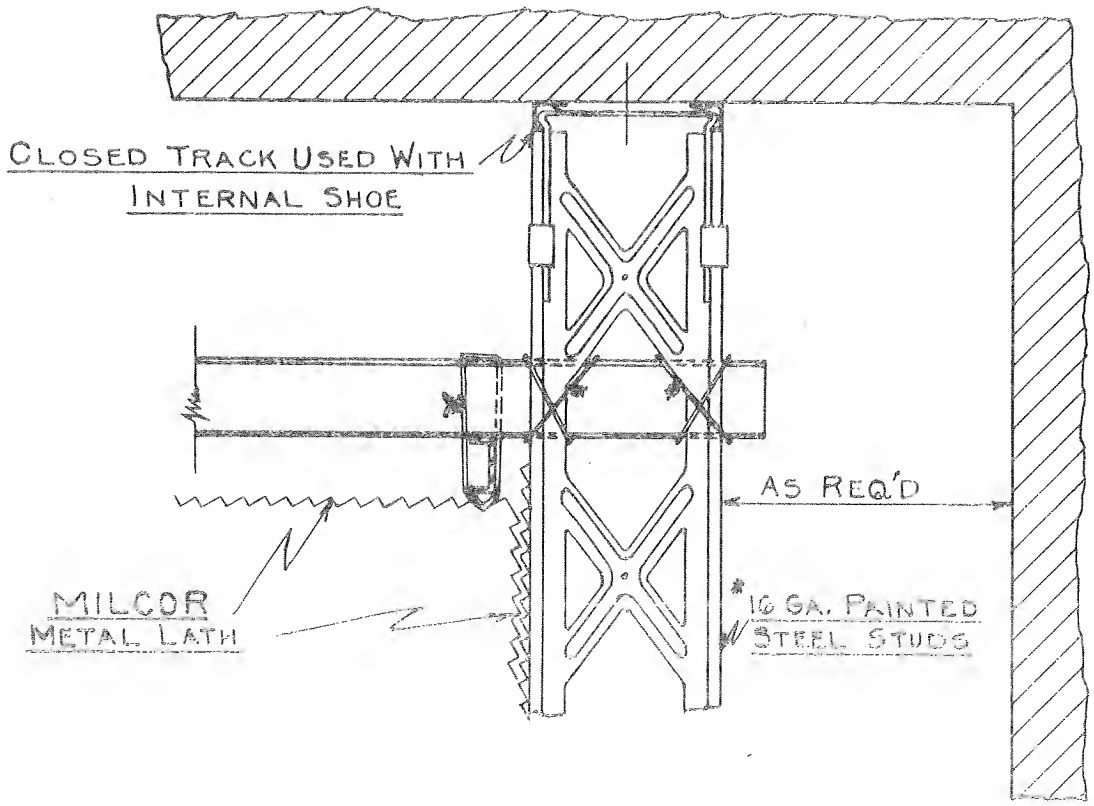
WOOD GROUND FASTENED TO
STEEL STUD WITH TIE WIRE.

INSTALLATION DETAILS OF MILCOR HOLLOW METAL STUDS.

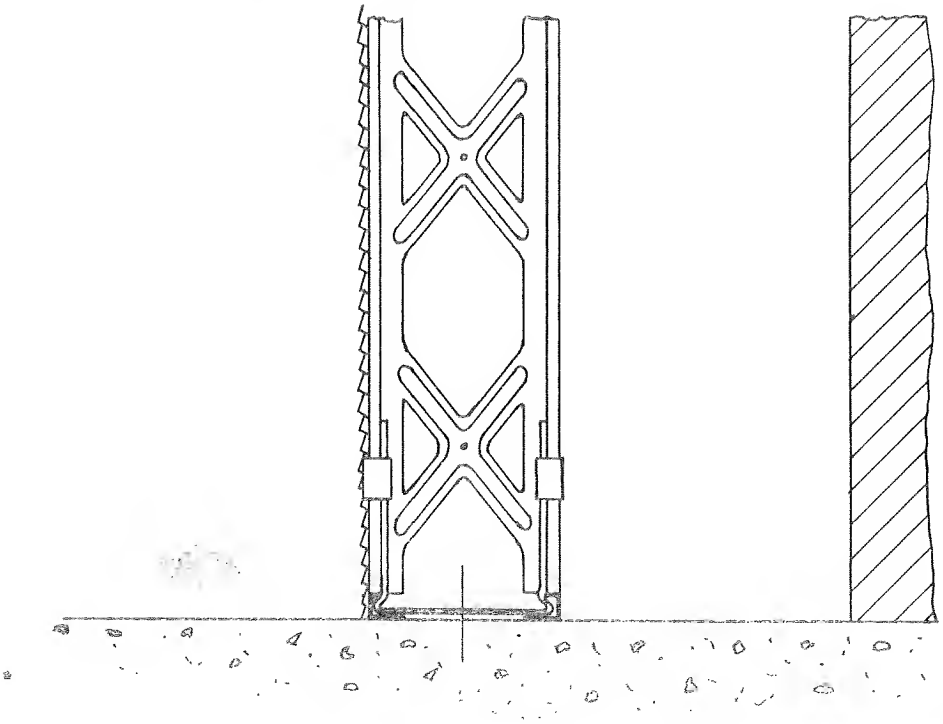
STANDARD DETAIL
Nº 6

MILCOR STEEL CO.
MILWAUKEE, WIS.

REVISED: 7-1-1940



FREE STANDING WALL FURRING

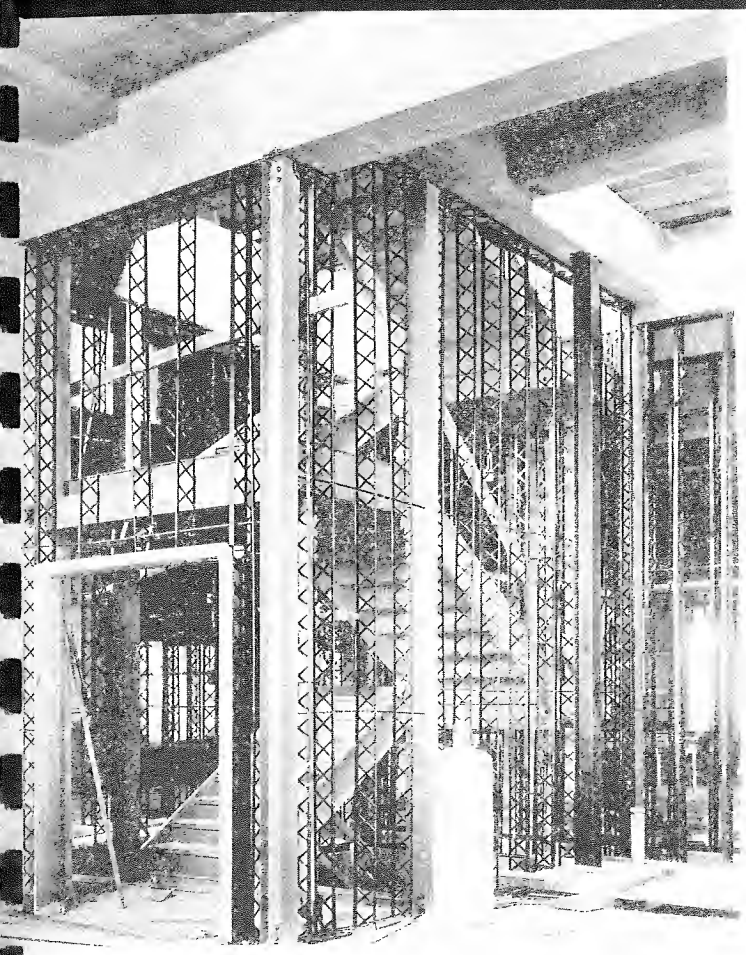


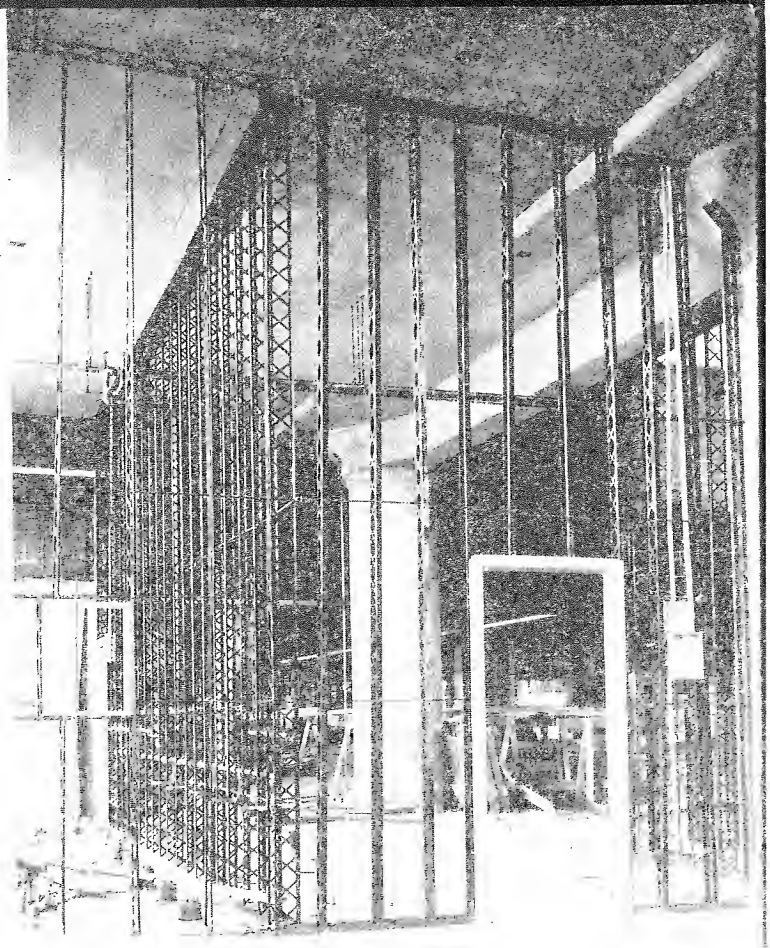
INSTALLATION DETAILS - MILCOR HOLLOW METAL STUDS USED AS WALL FURRING.

STANDARD DETAIL
Nº 7

MILCOR STEEL CO.
MILWAUKEE, WIS.

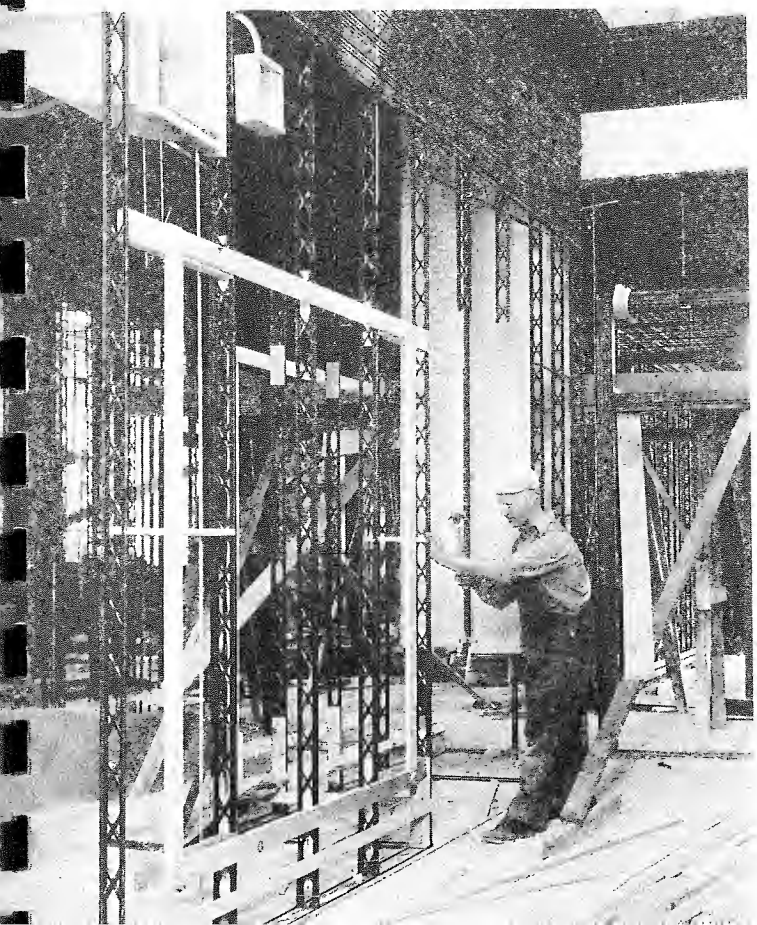
REVISED: 7-1-1940



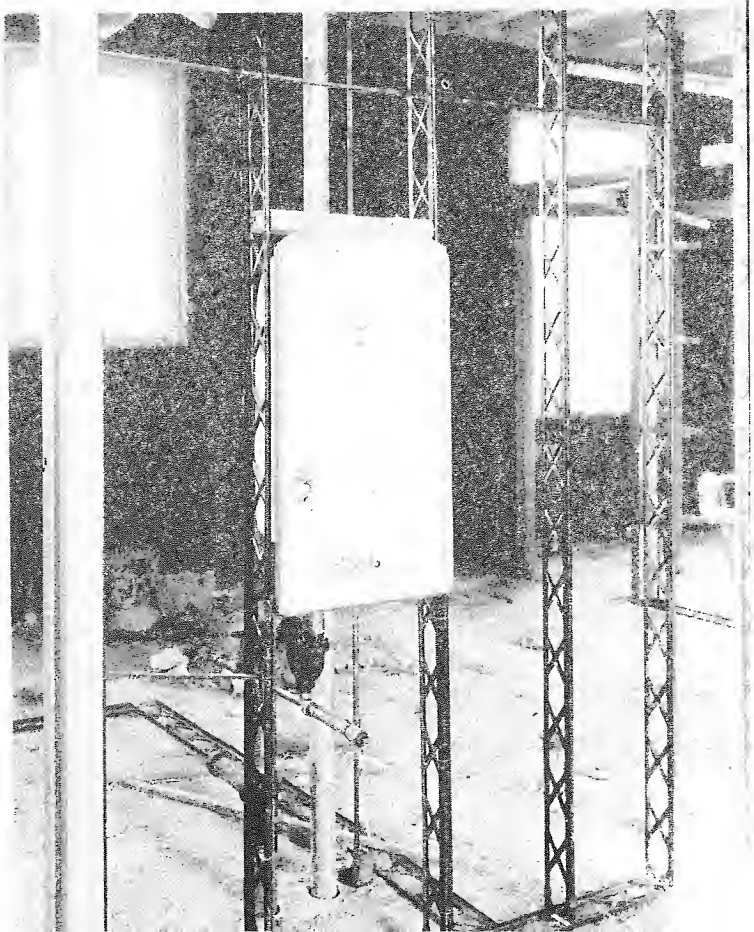


Working Post Office, Los Angeles, California – Sarver & Zoss, Inc., Los Angeles, General Contractor – United States Architect – A. E. Eiden, Los Angeles, Plastering Contractor – L. A. Lathing Company, Los Angeles, Lathing Contractor.

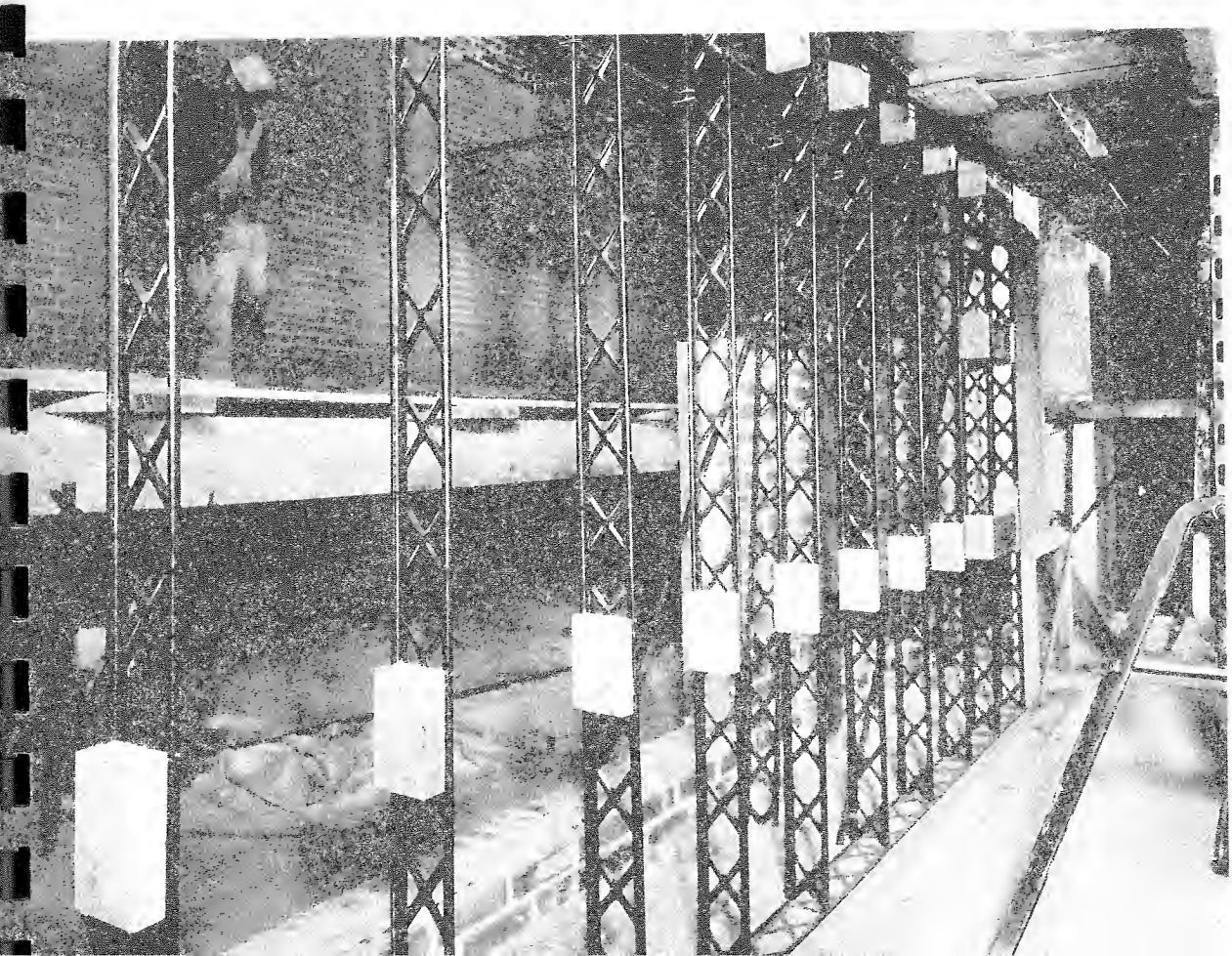
(Below) Wauwatosa High School, Wauwatosa, Wisconsin – Herbst & Kuenzli, Architects – Selzer-Ornst, General Contractor – Alfred Schmitt, Plastering Contractor.



(Below) U.S. Veterans Administration Facility, Sawtelle, Calif. – Robert E. McKee, Los Angeles, Gen. Contr. – Southwestern Plastering Co. Santa Monica, Plast. & Lathing Contr.



(Right) Mark Keppel School, Alhambra, Calif. - Marston & Mayberry, Archts. - Herbert Mayson, Los Angeles, Gen. Contr. - Joe E. Young, Los Angeles, Plast. Contr.



(Left) Wayne Township School - Vehling Bros., Indianapolis, Ind., Lathing & Plastering Contractors.

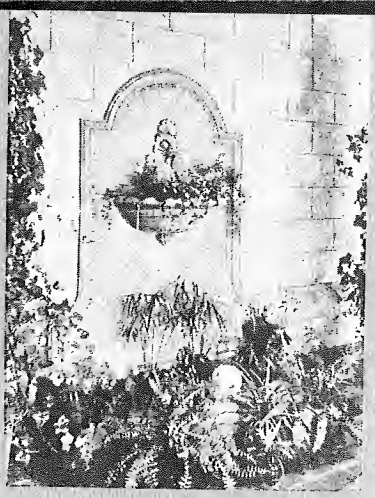
BUILD NOW!- with MILCOR

When Steel is the Back-bone of Walls and Ceilings

(above)

1. Milcor Stay-Rib Metal Lath in ceiling.
2. Milcor Cove Lath.
3. Milcor Expansion Corner Bead.
4. Kuehn's Specialmesh Metal Lath in walls.
5. Milcor Metal Window Stool.
6. Milcor Metal Base with Expanded Metal Wing.

An unusual dining room ceiling made possible by Metal Lath.



Beautiful effects can be obtained with plaster or cement over Metal Lath as shown by this fountain.

The interesting arch in this picture was made with Milcor Expansion Corner Bead and Netmesh Metal Lath. The bead makes a finished, enduring opening

MILCOR Metal Lath Gives Unlimited Freedom in Structural Forms and Shapes

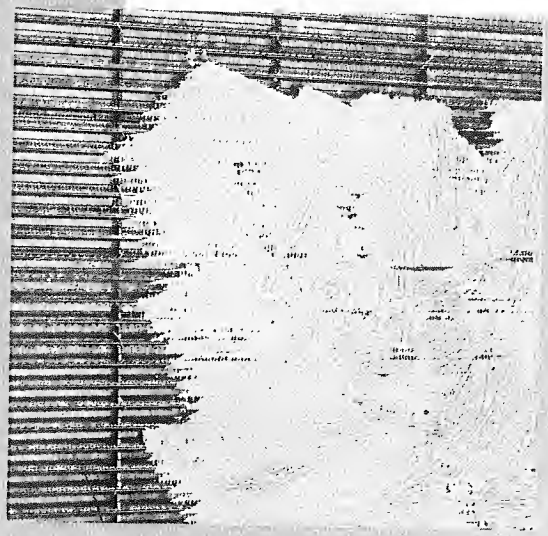
The deft trowel of today's plasterer utilizes the freedom of forms and shapes made possible by metal lath to develop more beautiful interior architecture. Many homes are now finished with interesting plaster textures which indicate a new awakening of appreciation for plastering as a medium of expression in architecture. No longer is plaster regarded merely as a base for decoration. It has become the decoration itself. Texture and color tone have been skillfully combined in the most charming manner. The plasterer of today is really a plastic decorator.

There is no end to the types and kinds of interior decoration which are possible with plaster on metal lath. Wall paper of any kind will maintain its beauty only over a proper plaster surface. Plaster also takes any painting desired and makes redecoration possible at low cost.

Metal lath makes curved ceilings easy to build.

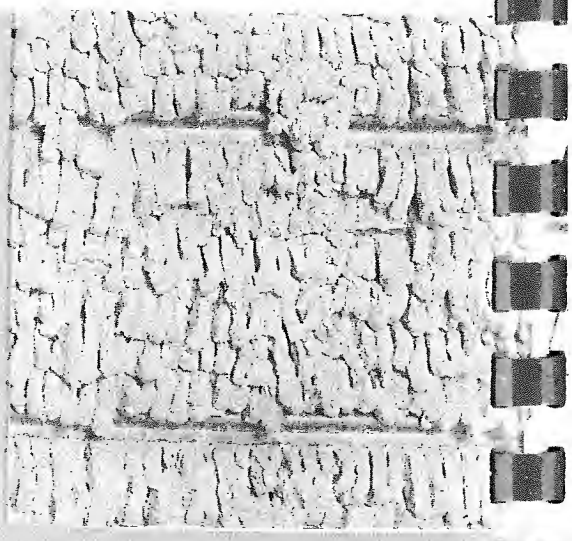
Metal Lath Assures a Good Plaster Job

Plasterers cannot skimp when Metal Lath is used as the plaster base because the plaster must be forced through the meshes of the lath. Three coats of plaster are always used with metal lath. A good, heavy plastering job, reinforced with steel, makes the finest wall.



The First Coat Covers the Lath

The first or "Scratch" coat of plaster is forced thru the Metal Lath so that it is "keyed" on both sides of the steel reinforcing. For your own sake, consider the value of a wall built in this manner as compared with a skimpy plastering job on a flimsy substitute plaster base.

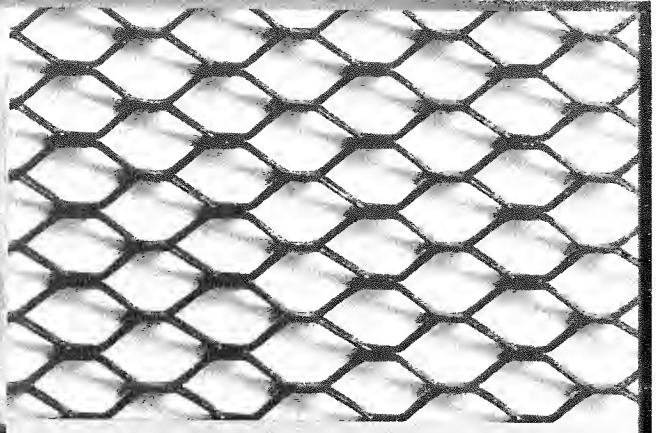


Completely Imbeds the Metal

This picture shows the back surface of plaster on Metal Lath. Notice how the plaster has been forced through the lath to such an extent that when dry and hardened it becomes permanently "clamped" to the steel. Kuehn's Specialmesh is so designed that all of the plaster is used in the wall. There is no waste.

This living room will keep its dignified beauty because its walls are made with plaster an rigid, crack-free Kuehn's Specialmesh Metal Lath.

Any architectural inspiration may achieve its perfect material expression with Metal Lath.



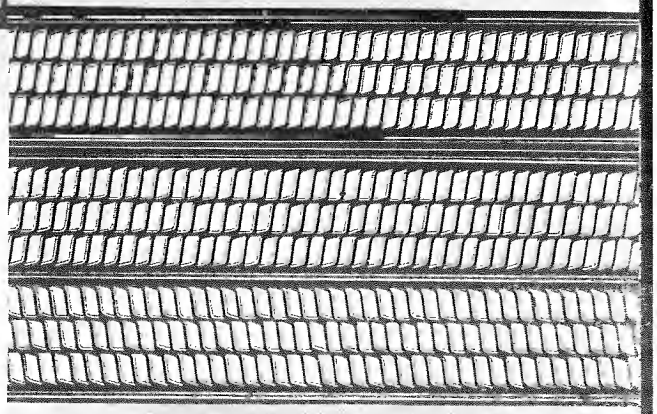
Netmesh Metal Lath.

Use These MILCOR Metal Laths for Interior Walls and Ceilings

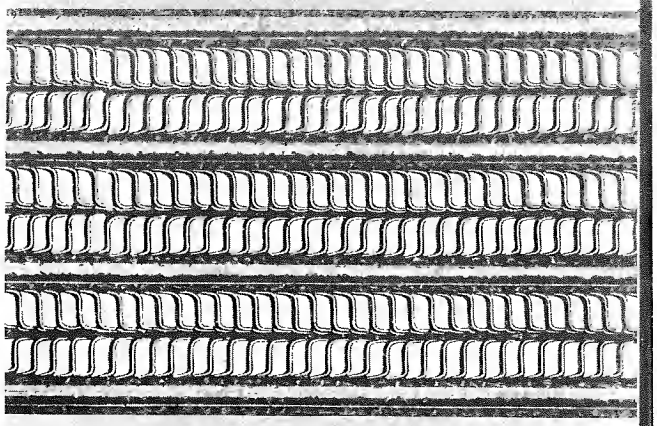
Netmesh Metal Lath is $1\frac{1}{32}$ inch by $\frac{9}{16}$ inch expanded Diamond Mesh produced by special machines and equipment designed and built by Milcor engineers. Due to the close rigid mesh only a comparatively small amount of plaster is required to produce a perfect key with speed and ease as well as economy in plastering material.

Kuehn's Specialmesh is a new rib lath specially adapted for interior walls and ceilings. The meshes are so formed that in plastering, the slightest pressure of the trowel completely imbeds the lath, and due to the small mesh, waste of plaster is eliminated. The longitudinal stiffening ribs are $\frac{3}{8}$ inch wide, spaced $1\frac{5}{8}$ inches on center and are connected by strands at $\frac{1}{4}$ inch intervals. These strands, in turn, are strongly reinforced at their junctures by stiffening members (two between each pair of ribs).

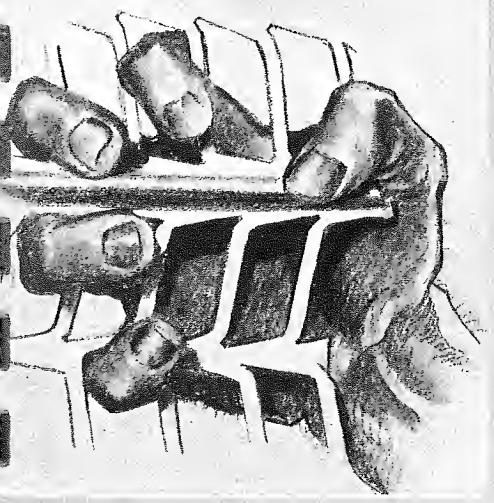
No. 1 Stay-Rib Lath is designed for maximum rigidity and unusual economy of material—an adequate key, however, is assured. The longitudinal stiffening ribs are $\frac{1}{2}$ inch wide, spaced $1\frac{3}{4}$ inches on center inter-connected by strands at $\frac{1}{4}$ inch intervals. These, in turn, are strongly reinforced at their centers by a stiffening member. For both ceiling and wall plaster reinforcement, Milcor Stay-Rib No. 1 is unusually satisfactory.



Kuehn's Specialmesh Metal Lath.



No. 1 Stay-Rib Metal Lath.



Holds Plaster in Grip of Steel

When plaster is applied to Metal Lath it is held by mechanical keys acting as strong finger grips which can never let go. That is why Metal Lath prevents cracks in plaster—why the whole wall is held together in one monolithic slab which cannot be subject to warping and shrinking.

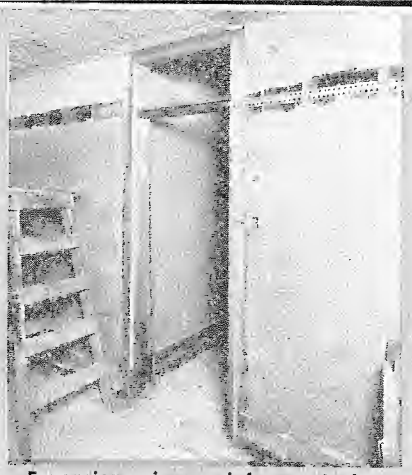
3 Lives Saved With Metal Lath

Although the fire in this room was so intense that window panes were shattered, three persons slept undisturbed on the other side of a Metal Lath and plaster partition. The fire-safe qualities of Metal Lath are priceless when human life is at stake.

7 Lives Lost With Ordinary Lath

The picture above is in ghastly contrast to the one at the left. Seven persons died in this fire of small origin, which soon became a raging inferno because of the combustible material used in construction.

Milcor casing gives a neat, trim effect, in keeping with the finest design.

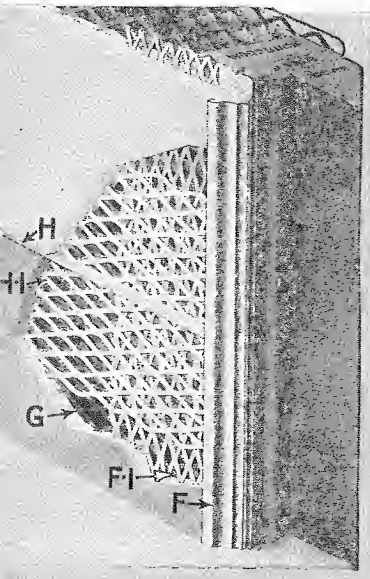


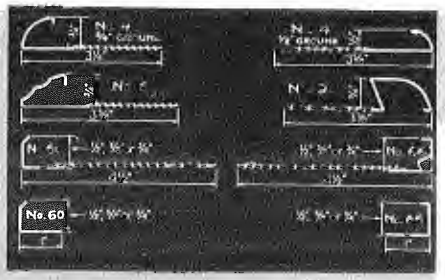
Expansion wings reinforce plaster around door or window casings.

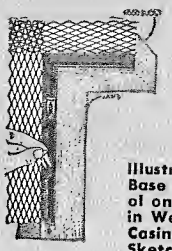
Wall crypt and arches made with Milcor Expansion Corner Bead.

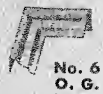
This bead is easily formed to many shapes; retains reinforcing value.

PROTECT AND BEAUTIFY WITH MILCOR CASING AND CORNER BEAD





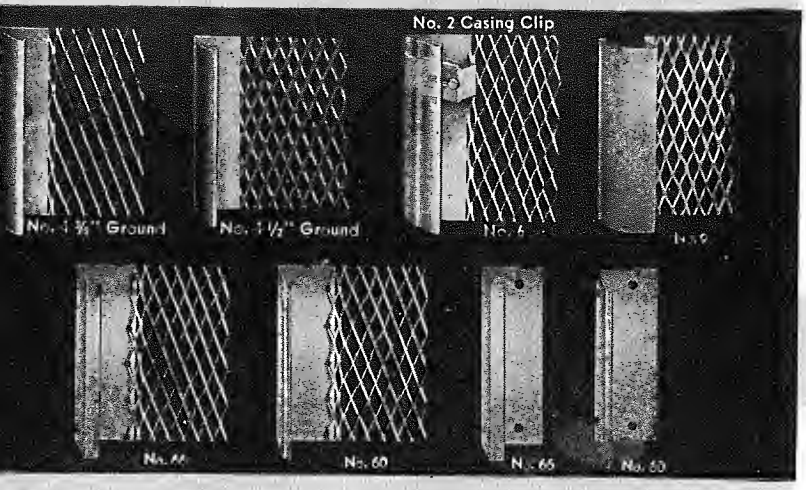


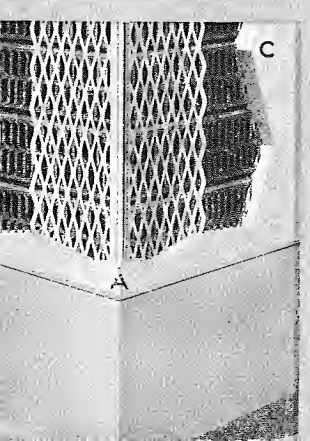


No. 6 O. G. Casing Mitre

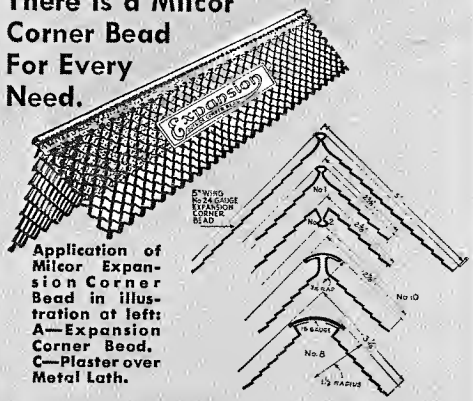
No. 9 Special ¼ Round Casing Mitre

Illustrations at left: H—Nose of Base Screed. H-1—Exponded Metal on Base Screed. G—Metal Lath in Wall. F-1—Expanded Metal on Casing. F—Surface of Door Casing. Sketch shows application of casing with special clip.





There is a Milcor Corner Bead For Every Need.



Application of Milcor Expansion Corner Bead in illustration at left: A—Expansion Corner Bead. C—Plaster over Metal Lath.

EXPANSION CASING
FOR DOORS AND WINDOWS

You will be delighted with the smart, good-looking effect of Milcor Expansion Casings on your doors and windows. Their simple beauty harmonizes with all types of interior decoration.

The neat, trim appearance of Milcor Casing provides a practical answer to the desire to get away from the old-fashioned, heavy wood trim around openings. The Expanded Metal Wing of this casing grips the plaster permanently to the metal and there can be no cleavage cracks or pulling away from the wall. The painted metal surface is easy to clean and perfectly sanitary. Milcor Metal Casing cannot warp or shrink. It is integral with the wall itself and provides an air-tight junction between the casing and wall which makes impossible the entrance of cold air at this point.

In addition to its artistic appearance, and practical, fire-safe features, Milcor Metal Casing offers the builder a real saving in construction. There is a reduction in labor due to simplicity in handling and considerable saving in installation time. Finishing cost is much less than with other materials.

EXPANSION CORNER BEADS
PROTECT CORNERS AND ARCHES

These corner beads have an Expanded Metal Wing which reinforces the plaster right up to the nose of the bead. There are no solid surfaces on Expansion Corner Beads where the plaster may or may not stick. The result is an effective reinforcement where it is most needed, and substantial assurance that the corners will withstand much more than average abuse.

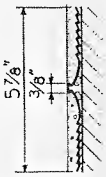
Years ago plaster corners in houses were protected with an ugly, heavy, wooden moulding. Modern homes and buildings now use metal corner beads only. These corner beads are ideal for arches and many other types of openings. They can be curved to any desired radius without losing their reinforcing value.

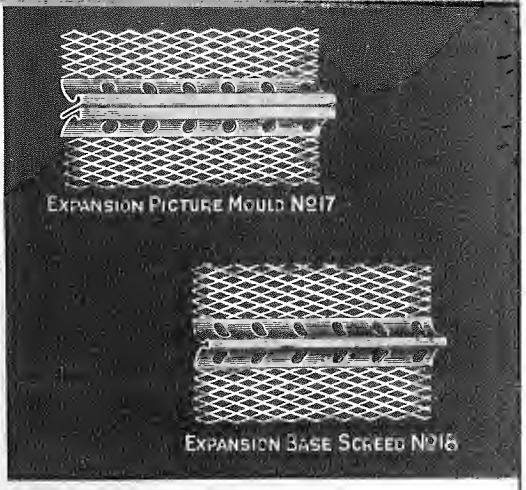
EXPANSION PICTURE MOULD

It pays to remember the details when planning a home and the foresight of specifying Milcor Expansion Picture Mould will be rewarded many times in years to come. This picture mould has Expanded Metal Wings integral with the mould itself. These wings reinforce the plaster right up to the surface of the mould which is flush with the plaster line. This mould is permanent, sturdy and sanitary. It forms a rigid, dependable support for the heaviest decorations.

EXPANSION BASE SCREED

This screed is ideal when a flush cement base is used at the bottom of a plaster wall. It is a firm, rigid dividing strip having Expanded Metal Wings to reinforce both the plaster and cement.



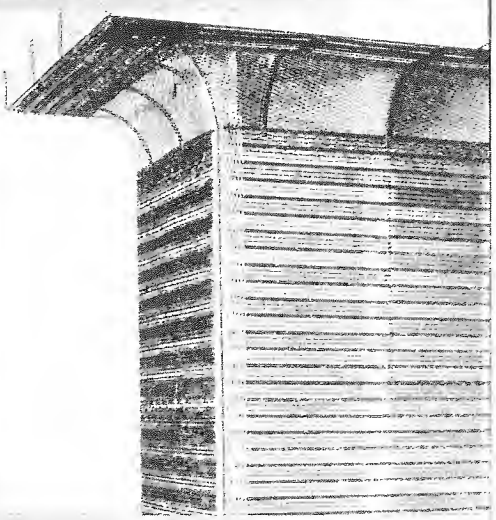


MILCOR COVE LATH

If you like cove ceilings, there is no better way to achieve them than by using Milcor Cove Lath as a steel back-bone to join walls and ceiling. Perfect coves may be made without the fussy and costly work of cutting wood brackets and forming the cove on the job. There is a 1½-inch overlap on the lath attached to wall and ceiling and this double reinforcing assures a smooth, crackless joint.

Milcor Cove Lath is made from Diamond Mesh Lath which is electrically welded to curved channel sections spaced 16 inches on center. Three sizes are made with radii of 6¾, 8¾, and 10¾ inches.

Finished plaster surfaces have radii of 6, 8 and 10 inches.

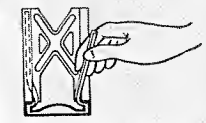


MILCOR STEEL STUDS

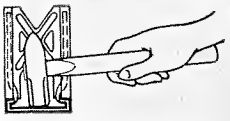
The cost of Milcor Steel Studs for non-bearing partitions compares favorably with ordinary wood studs and yet they offer the advantages of a sturdy steel member which is not affected by moisture and cannot swell, warp or split. These studs are held firmly in place and assure a wall of unusual strength and permanence.

Partitions made with Milcor Steel Studs are absolutely fire-safe. They resist stresses and pulls and offer high insulating value, sound resistance, and light weight.

Expansion Corner Beads, Picture Mould, Chair Rails, Casing, Cove Lath, and other finishing materials are applied to these studs in the usual manner. Heating and plumbing equipment take less time to install when these steel studs are used. The new embossed, "X" shaped Milcor Studs embody by far, the most advanced engineering design and the greatest number of advantages to the user of any Steel-stud for this purpose on the market.

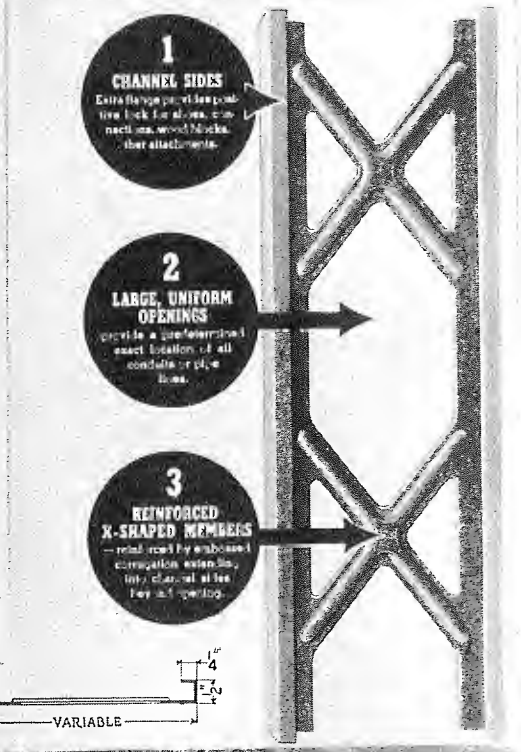


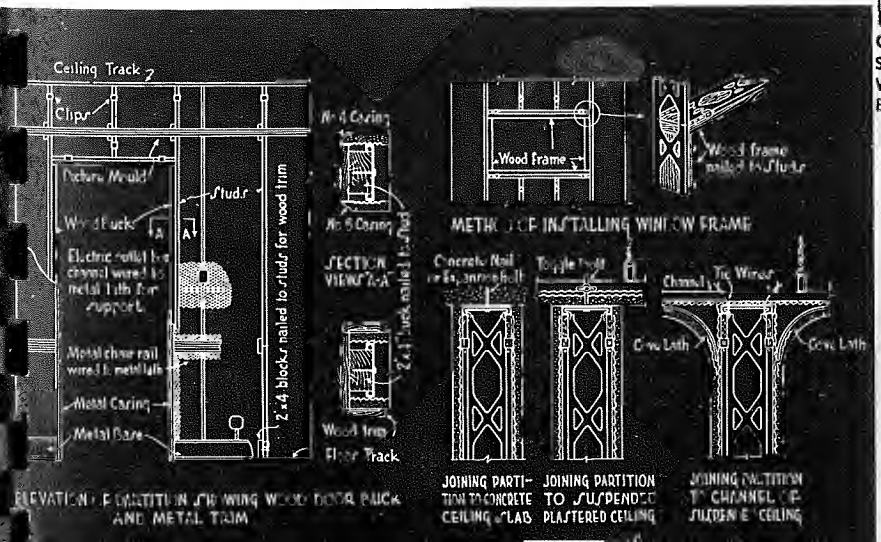
Shoe is Slipped into Channel Sections of Floor Runner and Stud as Shown

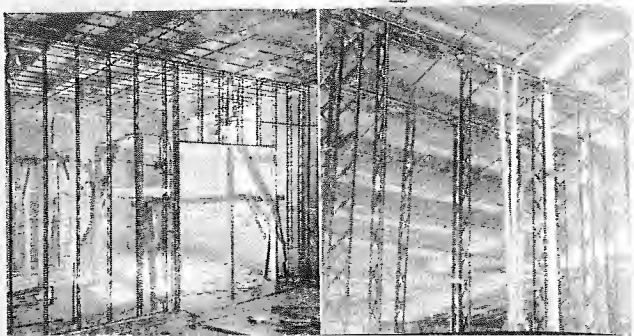


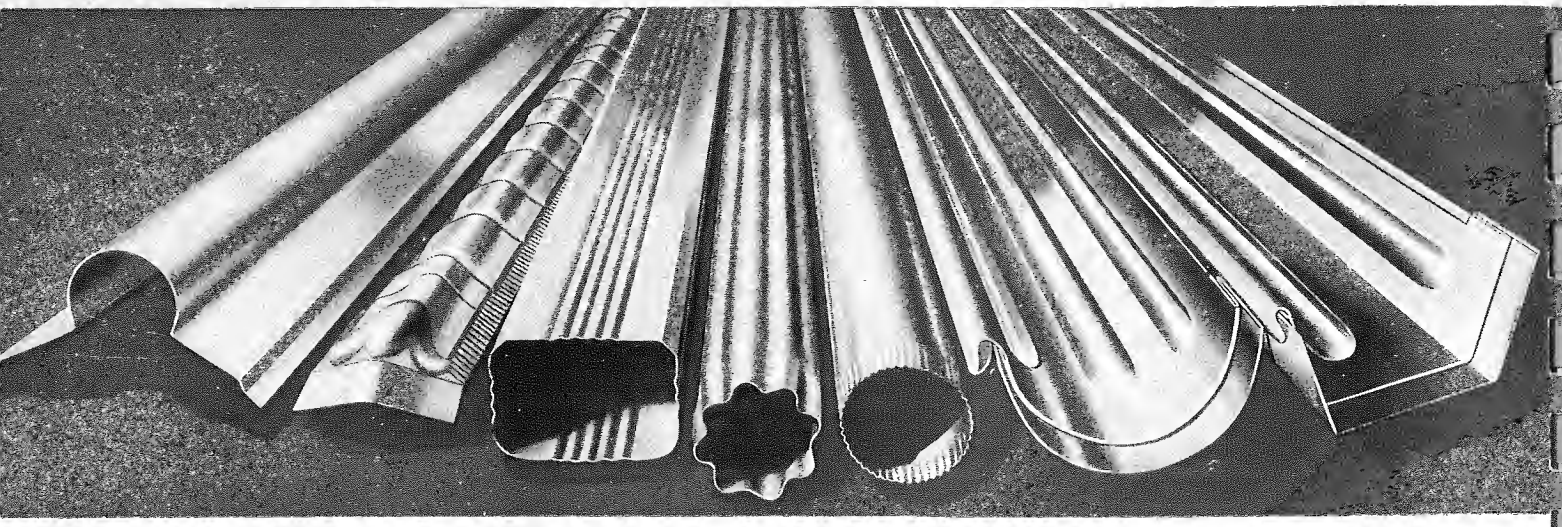
Shoe is Wedged into Floor Runner by Tapping with Hammer

Clips Slip Around Channel Sections and Shoe Arms—Wedged Tightly with One Blow of Hammer.







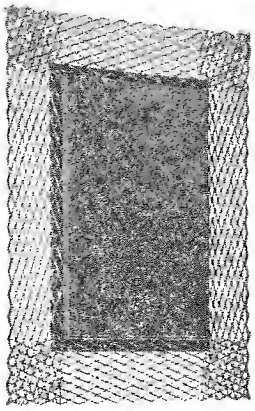


THE BEST RAIN CARRYING EQUIPMENT

COSTS NO MORE—WHEN YOU SPECIFY MILCOR

American home owners and builders have installed more than twice as much rain carrying equipment manufactured by Milcor as that of any other make. The reason for this overwhelming preference is that constant improvements in design and manufacture have put Milcor products far ahead of the field. Insist on them and you can be sure that you will have the best that money can buy.

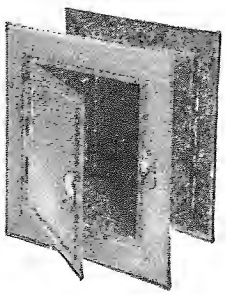
It is worth while to consider the use of copper rain carrying equipment because it possesses unrivaled beauty and an inherent ability to withstand the ravages of time and weather. It will never require painting, repairing, or renewal.



These Modern Steel Accessories Cannot Burn, Shrink, Rot or Warp

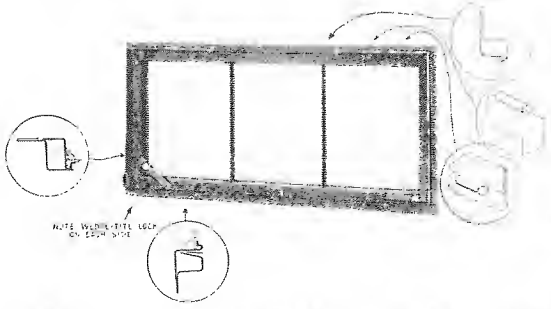
MILCOR METAL ACCESS DOORS

It is necessary to have access doors in certain parts of the home to permit key points in plumbing, heating, and electrical systems to be reached conveniently and easily. The Milcor Access Door is inconspicuous because its surface is flush with the plaster. Wall paper or paint may be put over the door to conceal it entirely. These doors come both with and without the expanded metal reinforcing wing. The door itself is removable or hinged to the housing as desired. Ready access to valves, fittings, etc. is provided at the turn of a screw. Available in 16 sizes.



MILCOR PACKAGE RECEIVER

This steel package receiver is absolutely sanitary and warp-proof. It is adjustable to wall thickness from 5 to 14 inches. The wall opening is 9 x 11 inches. Catches are made of wrought steel and are unbreakable.

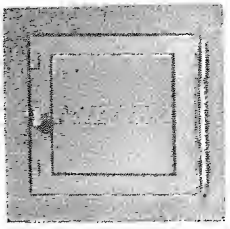


MILCOR STEEL BASEMENT WINDOWS

This steel window is absolutely weather-proof in design. The frame is stamped from a single steel sheet and formed without a joint. Special protection against driving rain is provided by the sill section slaping sharply dawnward. Steel windows in the basement add value to the home because they cannot swell, warp or get out of true. Steel storm sash and screens are available.

MILCOR FLUE OR CLEAN OUT DOOR

This door is stamped from highest grade copper alloy steel sheets. Hinges are integral with the frame and door. No riveting or welding is employed. Catches are of wrought steel.



MILCOR STEEL COMPANY

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